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ABSTRACT

Noting that little is known about how the social environment affects academic achievement among groups of students, this study examined the associations among substance use, violent/delinquent behavior, and academic achievement in groups of middle and high school students. Data sources for middle school students were the 1998 Washington State Survey of Adolescent Health Behaviors (WSSAHB) and the 1999 Washington Assessment of Student Learning; data sources for high school students included the WSSAHB and eleventh graders' averages on the Iowa Test of Basic Skills. Groups were defined by grade level, gender, and race/ethnicity. In order to more fully understand the dynamics linking risky non-classroom behavior to school performance, the study also examined the effects of poverty, attitudes, neighborhood characteristics, and social skills. Findings indicated that groups of middle and high school students with even moderate involvement with substance use and violence/delinquency had poorer overall achievement than groups of students with little or no involvement in these behaviors. For middle school students, behavior and attitudes about harmful behaviors were tightly linked (correlation =.96). High school students' attitudes and behaviors were closely related but not identical. Substance use was closely related to violence/delinquency. Poverty influenced student behavior, attitudes, and academic achievement. School resources did not predict substance use, violence/delinquency, or test scores. Risk and protective factors influenced substance use and violence/delinquency for both middle and high school students. Between 20 and 40 percent of Washington state middle and high school students reported the kinds of attitudes and behavior linked to impaired school performance. Numerous policy implications follow from the

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findings. Appended is a list of questions from the surveys used. (Contains 82 references.) (KB)

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Appendix A

The Impact of Substance Use and Violence/Delinquency on Academic Achievement for Groups of Middle and High School Students in Washington State

Abstract/Preview

In this study we examined the associations among substance use, violent/delinquent behavior, and academic achievement (as indicated by test scores) in *groups* of high school and middle school children. Because these risky behaviors commonly take place in groups, and attitudes towards these behaviors are nurtured in a social context, we analyzed our data at the group level (grade by gender by race/ethnicity). In order to more fully understand the dynamics linking risky non-classroom behavior to school performance, we also examined the effects of poverty, attitudes, neighborhood characteristics, and social skills. We found that groups of middle and high school students with even *moderate* involvement with substance use and violence/delinquency had poorer overall test scores than groups of students with little or no involvement in these behaviors. If schools and communities are concerned about improving achievement, they must address both attitudes and behaviors related to substance use and violence/delinquency. Intervention efforts need to engage the community in focusing on the learning environment *outside the classroom.* Intervention should start when students are young and continue through high school.

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Introduction

Across the nation, parents, educators, and policy makers are committed to improving the academic achievement of children in their communities. Achievement is typically measured by performance on standardized tests, and the federal "No Child Left Behind Act" has mandated that schools improve students' test performance ("No Child Left Behind Act of 2001 at www.ed.gov/nclb," 2001).

In Washington State, the Academic Achievement and Accountability Commission (A+ Commission) was designed to both develop and oversee an academic accountability system for the state's educational system (Academic Achievement and Accountability Commission, 2002). The A+ Commission has called for "clear, rigorous academic standards; tests to measure whether students are meeting the standards; and a system to hold schools, school districts and students accountable" (Partnership for Learning, 2001). In order to meet these goals, schools must improve their students' performance on state standardized tests.

Test scores, while not the only or necessarily the best measure of achievement, do reliably predict some markers of success and failure. For example, poor academic performance is a strong predictor of whether a student will drop out of high school (Battin-Pearson et al., 2000). Reducing dropout rates and raising the high school graduation rate to 90 percent is an ongoing national goal (US Department of Health and Human Services Office of Disease Prevention and Health Promotion, 2002).

This increased emphasis on accountability—at both federal and state levels—highlights the importance of identifying factors that affect test scores, not only for individual students, but for schools and groups of students within schools. Although most efforts to boost achievement take place in the classroom, certain aspects of the social environment, including risky behaviors such as substance use and violence/delinquency, also exert an effect on school performance (Pollard, Hawkins, & Arthur, 1999). Attitudes and behaviors that affect achievement are nurtured in social groups, at parties and other gatherings, on the street – in places where pre-teens and adolescents typically hang out with little or no adult supervision.

The 2001 Surgeon General's Report on Youth Violence makes a strong case for taking a public health approach to these kinds of risky behaviors, stressing that the "risk probabilities apply to groups, not individuals," and pointing out that "the public health approach offers a

practical, goal-oriented, and community-based strategy for promoting and maintaining health" (U.S. Department of Health and Human Services, 2001, p. 4).

How Does the Social Environment Affect Academic Performance?

Several non-classroom factors are known to affect achievement:(Battin-Pearson et al., 2000)

- Substance Use
- Violence/Delinquency
- Socio-Demographics (Poverty, Gender, Race/Ethnicity)

Substance Use

Substance use by students is a national concern. Over half of the nation's eighth graders report that alcohol or marijuana is easy to obtain (Johnston, O'Malley, & Bachman, 1998); over a quarter of high school students report seeing students at school drunk or high (Nolin, Vader-Kiernan, Feibus, & Chandler, 1997); and a third of high school students report having been offered, sold, or given an illegal drug at school (Kann et al., 1998). In Washington State, more than one in three 10th graders report drinking in the past month; almost one in four report binge drinking in the past two weeks; and more than one in five report using marijuana in the past month (RMC Research Corporation, 2001).

Several studies have found that individual substance use is related to poor academic performance (Andrews, 1991; Beman, 1995; Galambos & Silbereisen, 1987; Hawkins, Catalano, & Miller, 1992; Paulson, Coombs, & Richardson, 1990). In a comprehensive literature review, Battin-Pearson and colleagues noted that several studies "provide evidence that delinquency and drug use precede dropout and should be modeled as predictors of dropping out of school" (Battin-Pearson et al., 2000). In addition, substance use *by a student's friends* also predicts lower grades (Mounts & Steinburg, 1995).

Violence/Delinquency and Behavior Problems

Like substance use, youth violence/delinquency is a serious, high-priority concern for all citizens. Although the most alarming increases in American youth violence occurred between 1983 and 1993 (Cook & Laub, 1998), confidential self-reports about violent behavior "reveals no

change since 1993 in the proportion of young people who have committed physically injurious and potentially lethal acts" (U.S. Department of Health and Human Services, 2001).

A large body of research links conduct problems to poor academic achievement (Ferguson & Harwood, 1998; McMahon & Estes, 1997; Moffitt, 1990; Robins, 1991), and extensive research links such behavior problems specifically to poor linguistic skills (Hill, 2000). Violence and delinquency have been associated both with poor academic achievement (Maguin, Loeber, & LeMahieu, 1993; Regulus, 1994) and with an increased likelihood for school dropout (Battin-Pearson et al., 2000; Newcomb et al., 2001; Williams, Ayers, Abbott, Hawkins, & Catalano, 1999).

Socio-Demographics

Poverty

Poverty, or low socio-economic status (SES), directly increases the likelihood both for general school failure and for early high school dropout (Battin-Pearson et al., 2000; Newcomb et al., 2001). Washington Kids Count recently reported that having a high concentration of students from low-income families is the best predictor of both average school and average district performance on the Washington Assessment of Student Learning (2001b). This holds true even when a wide variety of other factors – school size, concentrations of student racial/ethnic populations, average years of certified teaching experience, teacher race/ethnicity, student-teacher ratios, and the district to which the school belongs – are taken into account. When comparing academic performance across schools, Weeks (1999) also found that poverty is a significant predictor of test scores. Similarly, when considering the impact of race/ethnicity and poverty on average school standardized test scores, the Washington Center for School Research reported that the percentage of students enrolled in the free or reduced-price lunch program explains between 12 and 29 percent of the between-school variance in scores (Abbot & Joireman, 2001). Poverty is also associated with risky health behaviors (Hawkins et al., 1992) and must be considered when evaluating the impact of these behaviors on achievement.

Poverty can also be manifested in limited school resources that may impair academic performance. Recent analyses revealed that, despite attempts at decentralization, resources and expenditures significantly impact performance at the district, rather than the school (building) level (Washington Kids Count, 2001b).

Gender

The relationship between gender and achievement is complex. Mau and Lynn (2000) reported that high school males score significantly higher on math and science tests, while females perform better on reading tests. In middle school, however, Capraro, Capraro, and Wiggins (2000) reported that males are no more likely than females to score well on standardized mathematics tests. Han and Hoover (1994) documented this age-related difference in performance patterns with "females scoring higher in reading, language skill, and mathematics computation up to age 15," when males take over the lead in mathematics. At the upper grade levels, females generally continue to score higher than males on verbal tests. The authors noted, however, that average gender differences are relatively small. These modest gender effects are echoed in Washington, where 2000 Washington Assessment of Student Learning (WASL) scores are virtually identical for 7th grade males and females in both math and reading (when special education and students with 504 plans[1] are removed from the analysis). On the 10th grade reading test, females score only marginally higher than males (Washington Kids Count, unpublished data log). Likewise, gender does not predict dropping out of high school when other factors such as general deviance, bonding to antisocial peers, and SES are considered (Battin-Pearson et al., 2000).

Race/Ethnicity

While white students in Washington State outperform Hispanic, Native American, and African American students on achievement tests, the relationship of race/ethnicity to achievement appears to be largely a function of disproportionate representation of minority groups in poverty (Washington Kids Count, 2001b). Similarly, Washington School Research Center found that while ethnicity explains 0 to 6 percent of the variance in academic achievement, it explains 32.7 percent of the variance for poverty in the school (Abbot & Joireman, 2001). However, when other factors are controlled, ethnicity directly affects high school dropout rates (Battin-Pearson et al., 2000; Newcomb et al., 2001). This mix of results suggests a continued need to consider both poverty and race/ethnicity in studies of academic achievement.

[1] 504 plans are special accommodation plans for mainstream students with learning challenges.

What Affects Involvement with Substance Use and Violence/Delinquency?

Several factors are known to affect substance use and violence/delinquency:

- Engagement in One Type of Risky Behavior
- Attitudes Towards Risky Behaviors
- Socio-Demographics (Poverty, Gender, Race/Ethnicity)
- Social & Moral Understanding; Social Skills
- Commitment to School
- Perceived Risk in the Community

In addition to examining how substance use, violence/delinquency, and poverty impact achievement directly, it is important to learn more about how young people become involved with the risky health behaviors in question. Does involvement with substance use increase the probability of involvement with violence/delinquency (and vice versa)? How are substance use and violence/delinquency linked to attitudes and beliefs about risky behaviors? How do other risk and protective factors (socio-demographics, social skills, commitment to school, community risk) relate to substance use and violence/delinquency?

Risk factors presumably increase the probability of involvement in harmful or risky behaviors; while protective factors are believed to both reduce risk and in some cases directly decrease the incidence of such behaviors (Hawkins et al., 1992; Williams et al., 1999). Several risk and protective factors impact both substance use and violence/ delinquency (Abdelrahman, Rodriguez, Ryan, French, & Weinbaum, 1998; Hawkins et al., 1992; Hawkins et al., 1998; Howell, Krisberg, & Jones, 1995). And the same risk and protective factors that influence substance use and violence/delinquency have also been found to influence academic achievement (Pollard et al., 1999).

Close Associations Among Risky Behaviors

Several studies have found an association between substance use and tendencies to engage in other problem behaviors, including delinquency and rebelliousness (Beman, 1995). Other researchers have reported that, for middle school students, aggression is a powerful predictor of substance use (Brook, Brook, Gordon, Whitman, & Cohen, 1990; Flannery, Vazsonyi, Torquati, & Fridrich, 1994). A strong relationship between substance use and delinquency has been found

in middle school students (DeHaan & Gunvalson, 1997; VanKammen, 1991), high school students (Barea, 1993), pregnant adolescents (Gillmore, Butler, Lohr, & Gilchrist, 1992), high-risk youth (Dembo, Pacheco, Schmeidler, Fisher, & Cooper, 1997; Wallisch, 1992), and homeless youth (Forst, 1994).

Attitudes and Beliefs about Risky Behaviors

In elementary, middle, and high school, attitudes and beliefs about risky behaviors can significantly affect students' engagement in risky behaviors (Bachman, Johnston, & O'Malley, 1998; Brook et al., 1990; Hawkins et al., 1992). According to Williams, Ayers, Abbott, Hawkins and Catalano (1999), students who are supportive of antisocial behaviors and believe that high-risk behaviors incur minimal costs are more likely to engage in substance use and delinquency than students who do not share these beliefs. Similarly, Voelkl and Frone (2000) observed that students who believe substance use positively affects academic performance and do not think they will get caught are significantly more likely to use marijuana and alcohol on school grounds. Analysis of the attitudes and beliefs of Washington State students indicated that attitudes favoring drug use correlate strongly with substance use (RMC Research Corporation, 2001).

Socio-Demographics and High-Risk Behaviors

Poverty has been identified as a risk factor for both substance use and violence/delinquency in several studies (Hawkins et al., 1992; Newcomb et al., 2001).

Typically, when race/ethnic differences in substance use are reported, white students show the highest levels of substance use (Flannery et al., 1994; Skager & Fisher, 1989; Vaccaro & Wills, 1998; Williams et al., 1999). Violence/delinquency also appears to vary by race/ethnic group, with a tendency for African American youth in particular to show elevated levels of delinquent behavior (Hawkins et al., 1992; Maguin et al., 1993; Nakhaie, Silverman, & LaGrange, 2000; Williams et al., 1999). Several authors report, however, that predictors for substance use and/or delinquency are similar across ethnicities (Flannery et al., 1994; Hawkins et al., 1992; Williams et al., 1999).

Gender differences in substance use depend on age, race/ethnicity, and substance (Katims & Zapata, 1993; Maguin et al., 1993; Vaccaro & Wills, 1998; Venuti, Conroy, Landis, & Chambliss, 2000). Typically, being male is associated with higher levels of risky behaviors (Newcomb et al., 2001). However, the majority of research on delinquency has focused on

males and may therefore reflect some definitional bias rather than true gender differences in behaviors. Overall, these findings highlight the need to take socio-demographic factors into account when investigating the impact of substance use or violence/delinquency.

Social Skills

Negotiating social situations involving peer pressure to engage in risky behaviors requires advanced skills in social cognition (Crick & Dodge, 1994; Deater-Deckard, Dodge, Bates, & Pettit, 1998). Children and adolescents with behavior problems frequently also have impaired social-cognitive or pragmatic language skills that can intensify the challenge of verbally resolving these complex and sometimes volatile situations (Hill, 2000). Having poor social skills is a significant risk factor for both substance use and violence/delinquency (Hawkins et al., 1992; Williams et al., 1999). In a study of students in Washington, RMC Research Corporation (2001) found that "positive social skills were associated with lower levels of alcohol use, drug use, delinquent behavior, and violent behavior" (p. xv).

Commitment to School

Many researchers have found links between risky behaviors and commitment or bonding to school (Brook et al., 1990; Hawkins et al., 1992; Hawkins et al., 1998; Williams et al., 1999). RMC Research Corporation (2001) observed a specific relationship between alcohol use and low commitment to school among students in Washington. Other researchers have reported that higher levels of substance use are associated with poor bonding or attachment to school (Flannery et al., 1994; Voelkl & Frone, 2000). Likewise, Voelkl (1997) noted that rebellious behaviors such as delinquency were negatively associated with increased identification with school.

Community Risk

Violence, delinquency, substance use, and education all occur in the larger context of the community in which children learn and grow. Researchers have linked poverty and mobility to poor academic achievement (Plunkett, 1997; Tapia, 1998; Temple, Reynolds, & Miedel, 1998; Vail, 1996). If membership in a community is unstable, it is difficult for schools, neighbors, and other concerned institutions or individuals to monitor children and adolescents, to provide them with educational assistance, and to divert them from risky behaviors (Hall, 2001). Several studies have found that neighborhood characteristics such as physical deterioration and high levels of crime are related both to the availability of substances and to juvenile delinquency or

crime (Hawkins et al., 1992). Additionally, higher levels of violence are associated with community disorganization (Sampson, Raudenbush, & Earls, 1997). A powerful component of the social environment in which children spend most of their time, community is potentially both a source of risk and a source of protection.

Rationale for the Present Study

Academic achievement, substance use, and violence/delinquency are all high-priority concerns, both nationally and locally. Our review of the literature highlights the need to consider (1) how risky behaviors (substance use and violence/delinquency) relate to academic achievement; and (2) how poverty and other risk and protective factors relate to these risky behaviors and, in turn, to achievement. The present study examined the associations among substance use, violence/delinquency, and test scores in groups of middle and high school students. We also looked at the effects of poverty, social skills, commitment to school, and community risk.

We cannot assume that risky behaviors and risk and protective factors affect achievement in the same ways at different stages of development. Many researchers maintain that prevention efforts must begin early. Flannery, Vazsonyi, Torquati and Fridrich (1994) state that "starting and concentrating prevention efforts in the early elementary years is the only effective means of prevention; we cannot afford to wait until middle or late adolescence to intervene" (p. 210). If we are to both start early and continue through high school (when risky behaviors are more normative), then we must study the relationships among these factors before students get to high school. We therefore included both middle and high school students in our analyses.

The risky behaviors under consideration typically emerge in a social context. In middle and high school, that context frequently is comprised of peers who tend to separate themselves into groups of the same age, gender, and race/ethnicity. Because many attitudes and behaviors are shaped, transmitted, and acted out in these groups, we analyzed our data according to grade, gender, and race/ethnic groupings within schools. Although age, gender, and race/ethnicity may exert independent effects on school performance, they are not practical targets for intervention. By controlling for their effects, we were better able to look at aspects of the social environment where intervention could make a difference.

Our approach enabled us to ask the following type of question: Within schools, does substance use among children of a specified grade level, gender, and race/ethnicity (10^{th} grade Hispanic females, for example, or 6^{th} grade white males) affect academic achievement among children in that group? We were *not* asking about individual behavior (Does Jennifer's use of drugs affect her test scores?), but about social environmental effects in general (If the girls in Jennifer's group at school use drugs, are they *as a group* more or less likely to perform well on achievement tests?).

Although prevention programs typically address groups of students, we know little about the efficacy of such programs at the group level. In order to succeed, interventions may need to be tailored to cultural background and other group characteristics (Gandara, 2000). We will be better equipped to address this issue if we have group data on the outcomes we hope to influence.

Methods

Overview of the Data

We gathered our data from results of achievement tests from the 1998-1999 School Year (SY) and the previous year's Washington State Survey of Adolescent Health Behaviors (WSSAHB). For the middle school sample, data included the 1997-1998 SY 6th grade WSSAHB results and the 1998-1999 SY 7th grade Washington Assessment of Student Learning (WASL) scores on the Math, Reading, and Writing scales. For the high school sample, data included the 1997-1998 SY 10th grade WSSAHB results and the 1998-1999 SY 11th grade Iowa Test of Basic Skills (ITBS) scores on the math and reading scales.

Because of confidentiality requirements, WSSAHB results were not available for individual students. Therefore, within each school and grade level, we identified groups of students by gender and race/ethnicity (for example, 10th grade Hispanic males or 6th grade white females). Within each of these groups, test scores and WSSAHB results were averaged and then matched.

While we could not assume that the students who took the WSSAHB in the 1997-1998 school year were necessarily the same students who took the achievement tests in 1998-1999, we based our analysis on the premise that aspects of a group's environment in one year can predict that group's achievement the following year. We assumed that, despite turnover in group membership, the overall attitudes and behaviors of groups were likely to persist over a period of one year.

Achievement

The Office of the Superintendent of Public Instruction (OSPI) administers the WASL annually to 4th, 7th, and 10th grade students, and for this study we used 7th grade results from 1998-1999 SY. The WASL is a set of criterion-referenced tests that cover skills associated with math, reading, writing, and listening. Except for the writing subsection, the answer format for the test is multiple-choice. The WASL dataset also contains non-achievement information concerning students' special education and special accommodation status.

Fourth, 6th, and 11th grade students took the ITBS in the 1998-1999 school year. Test scores for the ITBS are normalized based on national data on math, reading, vocabulary, and language scales. The ITBS is a multiple-choice test designed to assess basic skill proficiency in each of its

subsections. Questions often ask about situations that the student would encounter in everyday life. In 11th grade the ITBS is administered as part of the Iowa Test of Educational Development. The Iowa Test of Educational Development includes scales on social studies, natural sciences, and expression. We chose to use only the ITBS component of the 11th grade test because the math and reading scales on the ITBS are comparable to the math and reading scales on the WASL (Joireman & Abbott, 2001).

Several exclusion criteria were imposed on the state's WASL and IOWA data before individual achievement test scores were standardized and averaged into group scores. All students enrolled in special education programs and students with 504 plans that affected one or more of their test scores were excluded from the data sets. Additionally, students enrolled in English as a Second Language (ESL) programs were excluded. After these exclusions, the individual achievement scores were converted to *z*-scores. Each group's mean score was computed from these *z*-scores. We used *z*-scores in order to make scores on the tests' sub-scales comparable. After exclusions, we had 65,189 and 52,644 individual test scores, which were averaged into 3,739 and 2,760 group scores, at the middle and high school levels, respectively.

Health Behavior and Attitudes

The Survey of Adolescent Health Behaviors is administered biennially by OSPI to a large sample of 6th, 8th, 10th, and 12th grade students in the state of Washington[2]. The survey asks students detailed questions about a variety of health behaviors and attitudes including substance use, antisocial behavior, and perceptions of the community. Answers to the questions are clustered into 27 risk and protective factor scales and five health behavior factor scales,[3] which we used as the variables in our analyses (see Appendix A for more details concerning these factor scales).

For a group to be included in the analyses, at least 15 students needed to have valid WSSAHB results. In middle school, this requirement resulted in a total of 291 groups from the total state sample, with group sizes ranging from 15 to 104 students. In high school, there were 189 groups from the total state sample, with group sizes ranging from 15 to 202 students. For

[2] See 1998 Washington State Survey of Adolescent Health Behaviors: Technical Report for details on sampling technique and informed consent procedures.
[3] See 1998 Washington State Survey of Adolescent Health Behaviors: Analytical Report for details on scale construction and validation

many of the smaller groups, some WSSAHB scales did not meet the minimum response requirements due to skipped items, so many of these groups had missing data. Data for these groups were imputed using a linear trend analysis technique. Data were imputed only for groups with complete data on all five of the health behavior scales (Alcohol Use, Drug Use, Violence, Delinquency, Weapon Carrying). We used linear trends analysis instead of multiple iteration (MI) techniques to impute these data because less than 3% of all the data for both middle school and high school were missing. When so few data are missing, the advantages of using MI techniques will not be greater than those of using a conservative imputation approach such as linear trends analysis.

Matching and Demographics of the Sample

For the middle school sample, we matched WSSAHB and test score data only for groups in schools where 6th and 7th grades were in the same building, as it seemed unreasonable to assume that group attitudes and behaviors in one school would have effects on group achievement in another school. This limitation affected our ability to generalize our findings at the middle school level. Specifically, we could not generalize about schools where 6th and 7th grade students were not in the same building. This limitation also could have enhanced the continuity between 6th grade attitudes/behaviors and 7th grade academic achievement. Although neither of these hypotheses could be tested with this dataset, they should be investigated in future studies.

Matching WSSAHB and test score data yielded 117 middle school groups and 174 high school groups that had both WSSAHB and achievement data. These groups represented 41 middle schools (in 28 districts) and 72 high schools (in 56 districts).

Table 1 shows the demographic breakdown of the groups. With the notable absence of both male and female high school Native American groups, the distribution of the groups closely resembled the gender-by-race/ethnicity distribution of public school students in the state (Washington Kids Count, 2001a). On both the WSSAHB and test scores, the mean scores of our final sample of groups closely paralleled the mean scores for all groups in the state. Table 2 shows the mean WSSAHB and achievement scores in our final sample and the mean WSSAHB and achievement scores for all the valid groups in the state from which we could derive our sample.

Final Datasets

The final dataset at the middle school level consisted of group averages on all the WSSAHB risk, protective, and health behavior scales; information provided by OSPI concerning the percentage of students in each school enrolled in the free and reduced lunch program (our indicator of poverty); and group averages on the math, reading, and writing scales from the WASL.

Similarly, the high school dataset consisted of group averages on all the WSSAHB risk, protective, and health behavior scales; information concerning the percentage of students in the school enrolled in the free and reduced lunch program; and group averages on the math and reading scales from the ITBS.

It must be noted that the poverty measure clustered groups within schools. The fact that multiple groups shared the same poverty measure indicates a lack of independence. Typically, lack of independence between groups necessitates a correction. In this instance, however, we found no statistical justification for correcting the poverty measure because we could not detect a *statistical* violation. At both the high school and middle school levels, variances of the standardized residuals were small. Also, we found no differences in the means and standard deviations when we compared schools and groups within schools. These findings suggest that while the assumption of independence was violated at a conceptual level, this violation was not a statistical concern (which may be explained by the fact that most schools contained clusters of only two groups). We did not, therefore, statistically correct the poverty measure. Instead, keeping in mind that a lack of independence will inflate significance levels, we used a more stringent criterion for judging the significance of paths that involved the poverty measure.

Finally, although we compiled data on key resources for each school (such as programmatic spending per pupil, student-to-teacher ratio, and staff spending per pupil), we did not include these school resource variables in our final analyses because preliminary analyses revealed that they did not predict substance use, violence/delinquency, or test scores. This finding is consistent with other analyses that have shown little relationship between school spending and achievement (Washington Kids Count, 2001b; Weeks, 1999). Only district spending has been shown to affect test scores (Washington Kids Count, 2001b), and the present sample did not include enough districts for us to analyze the effect of spending at the district level.

Data Analysis

We used structural equation modeling (SEM) to analyze the data. SEM is a maximum likelihood procedure that simultaneously solves several regression equations representing the directional relation between factors. The advantage of using SEM in this analysis was two-fold. First, SEM allowed us to consolidate variables into latent or unmeasured factors. Many attitudes and behaviors measured by the WSSAHB and achievement test scales are indicators of larger theoretical constructs or factors. By identifying the WSSAHB scales as indicators of larger latent factors, we were able to estimate the overall effect of a factor on other latent factors instead of estimating the effect of each variable independently. The second advantage of using SEM was that we were able to correlate the error terms associated with each variable. With data gathered through surveys, similar wording of questions and respondents' motivations to answer questions in particular ways often results in correlated error terms. Unlike ordinary least-squares regression, which rests on the assumption that the errors between variables are not correlated, SEM allows errors to be modeled and correlated.

As a model-fitting procedure, SEM is designed to compare and validate models. Three indices for measuring fit were used to evaluate the overall fit of each model: the comparative fit index (CFI), the Bentler-Bonnett nonnormed fit index (NNFI), and the root mean square error of approximation (RMSEA). The convention for judging good fit with the CFI and NNFI is an index score greater than 0.90. Model fit is judged to be good when the RMSEA index and associated confidence interval (CI) is less than 0.05. Each of these model fit indices has unique advantages and disadvantages. Because each index has drawbacks, we developed a two-out-of-three standard when judging fit. This standard provided us with rigor when judging fit, but did not force us to accept or reject a model on the basis of only one index.

Results

Middle School Model

The hypothesis driving the middle school model was that group achievement would be predicted directly by levels of substance use and violence/delinquency in the group. These risky behaviors (substance use and violence/delinquency) would be affected by group attitudes concerning substance use and violence/delinquency and by group perceptions of school and community environments. The original analysis included school poverty (as a discrete variable) and eight factors that were latent constructs for achievement, violent/delinquent behavior, violent/delinquent orientation, substance use behavior, substance use risk, perception of community risk, social and moral understanding, and school environment. Based on confirmatory factor analysis (CFA) for the measurement model, we revised the original hypothesis and only included five factors (achievement, substance use involvement, violence/delinquency involvement, perceived community risk, social and moral understanding) and two independent variables (school poverty, little commitment to school) (see Table 5). The final factor structure and factor loadings are shown in Table 6.

The **achievement** factor consisted of three scales from the WASL—math, reading, and writing. Each showed strong factor loadings, indicating a strong relationship among the three scales.

The violent/delinquent behavior factor consisted of four scales from the WSSAHB. The factor was defined by average scores in the group for the violent behavior, delinquent behavior, antisocial behavior, and weapon carrying scales. With the exception of antisocial behavior, these scales were measured on a three point scale: 1 indicating no target behavior, 2 indicating at least one target behavior within the past year, and 3 indicating more than one target behavior in the last 30 days. Antisocial behavior was a composite score on a scale of 0 to 1, with higher scores indicating greater incidence of the behaviors. Appendix A presents the items underlying each of these scales.

The violent/delinquent orientation factor (reflecting attitudes) was defined by average group scale scores for rebelliousness, impulsiveness, and antisocial attitudes (see Appendix A). We initially included a scale that indicated the average age at which antisocial behavior was initiated

in the group. We dropped this scale, however, because it offered no option for initiating antisocial behavior before the age of 12, which resulted in a floor effect for the scale.

Initial analysis of the violent/delinquent behavior and violent/delinquent orientation factors revealed strong factor loadings for all the indicators. The CFA also showed a very strong correlation between these two factors ($r = 0.91$), indicating that groups that showed an orientation towards violence/delinquency were also engaging in these behaviors. In accordance with established statistical procedures for highly related factors (Kline, 1998), these two factors were combined into one factor that we named **violence/delinquency involvement**.

The substance use behavior factor reflected group levels of alcohol use and drug use. The indicators of alcohol and drug use were measured on a 4-point scale: 1 indicating no use in lifetime, 2 indicating use in lifetime, 3 indicating use in past year, and 4 indicating use in the past 30-days. The factor that represented group substance use attitudes (substance use risk) was comprised of measures of perceptions of drug laws in the community, the ease of obtaining drugs, and risk from drugs. Much like the violence/delinquency factors, the initial CFA showed a very high correlation between substance use behaviors and attitudes ($r = 0.96$). Therefore, these factors were combined into a **substance use involvement** factor.

Another latent factor in the middle school model represented the groups' **perceived community risk**. This factor was derived from WSSAHB data on attachment to neighborhood and beliefs about community disorganization. Initially, this community risk factor also included measures of community and school mobility, but they were dropped from the analysis because they showed weak factor loadings and produced large residuals.

The indicators for the **social and moral understanding** factor were group averages of the WSSAHB "belief in the moral order" and "social skills" scales. These scales were derived from questions that asked what one would do in difficult situations that taxed moral convictions or required social skills (see Appendix A).

Our original school environment factor consisted of three measured scales from the WSSAHB. This factor was defined by the opportunities the group felt existed within the school for prosocial involvement, the perceived rewards for being involved in these activities, and group commitment to school (a high score on this little commitment to school scale reflects low commitment). The items defining each of these scales is described in Appendix A. The CFA and analysis of the correlation matrix (Table 3) showed little construct validity for this factor

grouping. Therefore, we dropped the factor from the analysis, but retained **little commitment to school** as an independent variable in the structural model. At 6th grade the opportunities for prosocial involvement in school are limited, so dropping the "opportunities" and "rewards" scales from the model seemed theoretically sound. However, we could find no theoretical justification for dropping little commitment to school from the model.

The structural model for the middle school sample is shown in Figure 1. This model tested the original hypothesis that poverty in the school and group levels of substance use involvement and violence/delinquency involvement would affect group test scores. It also tested the hypothesis that group levels of social and moral understanding, community risk, and school commitment would affect group levels of drug use involvement and violence/delinquency involvement. Existing theory, as well as the CFA, suggested a strong correlation between violence/delinquency involvement and substance use involvement. In order to address this correlation, we modeled the disturbance terms (error terms for the factor) as correlated. This path would indicate that some unknown variable or factor is having an effect on both violence/delinquency involvement and substance use involvement.

The final middle school model showed adequate fit with a CFI = 0.96, NNFI = 0.93, but a RMSEA = 0.08 (CI = 0.06, 0.10). While we judged this model to have adequate fit, the interpretation of the model should proceed with caution because the RMSEA indicated that this model generated a substantial amount of residual error. Analysis of the residuals suggested that the writing and math scores from the WASL produced the largest residuals in the model.

We tested two alternative hypotheses at the middle school level to determine if either showed better fit than the model specified in Figure 1. The first alternative model allowed all factors to impact test scores while maintaining the directional structure between the factors shown in Figure 1. The reasoning behind this model was that each variable could directly affect academic achievement rather than affecting achievement through the mediating factors of substance use involvement and violence/delinquency involvement. This model did not improve the fit of the data so we rejected it in favor of the original, more parsimonious model.

The second alternative model hypothesized that little commitment to school directly affected achievement. We tested this model because previous research has shown that an individual's commitment to school has a direct impact on achievement. We wanted to determine if this finding held at the group level, as well. We found that this path did not improve model fit. This

model also showed poor theoretical validity, as lower commitment to school was associated with higher test scores. The lack of validity for this path may be due to a suppressor effect between the two involvement factors and "little commitment to school." However, analysis of the correlation matrix suggested that the direct path from school commitment to achievement may not be valid in middle school. Bivariate analysis showed that little commitment to school was not correlated with math or reading and was only moderately correlated with writing scores (see Table 3). Anomalies concerning the little commitment to school variable are addressed in more detail in the technical discussion.

High School Model

The high school model was constructed from the same hypothesis that we tested at the middle school level – that test scores would be directly impacted by poverty in the school, substance use, and violence/delinquency. Furthermore, attitudes concerning these behaviors and risk factors within the community would affect substance use and violence/delinquency. Table 7 lists the six factors (substance use behavior, substance use risk, violent/delinquent behavior, violent/delinquent orientation, perceived community risk, social and moral understanding), two independent variables (school poverty, little commitment to school) and two dependent variables (math test scores and reading test scores) in the high school model.

In order to directly compare the middle and high school models, we first ran the final middle school model, as shown in Figure 1, with the high school data. This model showed very poor fit. The model also produced poor factor loadings for the ITBS math and reading scores, suggesting that these two scores may not be measuring the same construct. Therefore, we ran separate models with **math** and **reading** as distinct dependent variables. Even with this modification, the model that fit the middle school sample did not fit the high school sample, suggesting that the paths impacting achievement are different for high school and middle school groups.

Analysis of the factor loadings for this model also suggested that, at the high school level, *risks and behaviors were distinct constructs*. A general "involvement" factor, therefore, was not appropriate for the high school sample. We split the violence/delinquency involvement factor into **violent/delinquent behavior** and **violent/delinquent orientation**. The substance use involvement factor was split into **substance use behavior** and **substance use risk** factors. We

did maintain the relation found at the middle school level between the involvement factors by correlating the error terms between substance use behavior and violent/delinquent behavior.

In addition to splitting the middle-school "involvement" factors, we dropped one indicator from the violent/delinquent behavior factor. Although weapon carrying showed good loading on the factor, it produced substantial residual error. This residual error was not eliminated when we correlated the weapon-carrying error term with other error terms within the factor structure (and we could find no theoretical basis for correlating it with the error terms of other indicators). Dropping this indicator from the model greatly improved model fit. Table 8 shows the factor loadings for all the indicators included in the high school model.

LaGrangian testing of unmodeled relations showed a strong reciprocal relation between substance use risk and behavior. This correlation would be predicted by existing theory as well. However, a reciprocal path could not be modeled without violating Wright's Rule of No Feedback Loops (Loehlin, 1998). Therefore, this relation was modeled as a correlation between the disturbance terms for the two factors. The correlation was set to 1, indicating that a variable exists that has a direct but equal effect on both substance use risk and substance use behavior.

The LaGrangian tests also showed that the social skills indicator for the social and moral understanding factor was having a strong effect on substance use behavior. This effect was independent of the factor. In other words, modeling the relation between the factor of social and moral understanding and substance use behavior did not improve fit. However, modeling the relation between social skills and substance use behavior did improve fit.

We were also interested in whether little commitment to school had a direct effect on test scores. Adding this direct path did not improve model fit. However, LaGrangian testing of unmodeled relations showed a strong correlation between school commitment and the academic achievement measures. We modeled this as a correlation between the error of the test scores and the little commitment to school variable. This correlation indicated that a factor or variable *not* included in the model was mediating the link between little commitment to school and test scores. While the correlation significantly improved the fit of the model, it was not in the predicted direction. Analysis of the bivariate relationship (Table 4) also showed that the relation is in the opposite direction from what would be predicted. This finding could be an artifact of the grouping procedure, a suppressor effect, or an indication that little commitment to school and test scores shared a more complicated and dynamic relation than the model could reveal.

The final model for the high school sample is shown in Figure 2. We judged this model to have adequate fit with a CFI = 0.93, NNFI = 0.90 when predicting math scores, and CFI = 0.94, NNFI = 0.91 when predicting reading scores. The RMSEA for both models (both math and reading = 0.09, CI = 0.08, 0.11), however, was larger than desired. As with the middle school model, this large RMSEA indicated that the model generated a substantial amount of residual error.

We tested an alternative "direct-effects" model that resembled the alternative model we tested on the middle school sample. When we gave all factors an opportunity to directly affect test scores, the fit of the model did not improve. Therefore, we rejected the model in favor of the more parsimonious model shown in Figure 2.

Estimating Achievement Levels

We based our estimates of achievement levels on the final middle school and high school models. We calculated these estimates to assess whether the impacts mapped by the model predicted substantial differences in achievement. Achievement levels were estimated based on the unstandardized regression equation that solved for achievement. In the high school sample, these were the equations that solved for ITBS reading and math scores. In the middle school sample, we based the computation on the equation that solved for the achievement factor. While we converted the results of the equations into scores that could be compared to objective achievement criteria, all the estimated scores were derived from the relations specified in the model. Any changes in the model that would affect the direction of effect or the path coefficients could result in different achievement estimates. Therefore, the estimates cannot be generalized to situations where these models did not fit. The estimates should only be used to conceptualize the magnitude of effects found with these models.

In Washington, middle school students' WASL scores fall into one of four possible achievement levels. Scores in Levels 1 and 2 are considered below the level necessary to meet basic state standards. In high school, the ITBS categorizes scores into four levels based on national quartiles. Scores in the 1st and 2nd quartile are below the national average.

The major hypothesis driving this analysis was that violence/delinquency and substance use directly predicted achievement. Therefore, when solving the equations for our achievement factors, we varied the levels of violence/delinquency and substance use while holding constant

all other factors that directly predicted achievement. *At the middle school level*, we allowed violence/delinquency involvement and substance use involvement to vary together. Because of the high correlation between the disturbance terms for these two factors, we felt it would be unrealistic to hold one of these factors constant while varying the other. At the high school level, however, although the correlation between violent/delinquent behavior and substance use behavior was significant, it was relatively small. Therefore, in each of the equations we held one of the risky behavior factors constant while varying the other. For example, holding violent/delinquent behavior constant, *substance use behavior significantly impacted math test scores*. But violent/delinquent behavior did not directly affect math when we controlled for substance use behavior. For reading, we found just the opposite: holding substance use behavior constant, *violent/delinquent behavior significantly impacted reading test scores*, but substance use behavior did not directly affect reading when we controlled for violent/delinquent behavior.

For middle school students, the simulations predicted achievement levels for groups of students that had "moderate" or "low" levels of involvement with both substance use and violence/delinquency. For these 6th grade groups, "moderate" indicates that, on average, the group members had engaged in one to two violent/delinquent acts in the past year *and* had tried alcohol or drugs in their lifetime. Even these moderate levels of risky behaviors and attitudes predicted scores that were about a full achievement level lower than those of groups that, on average, avoided these risky behaviors/attitudes (see Figure 3).

For high school students, the simulations predicted achievement levels for groups of students that had "moderate" or "low" levels of substance use behavior and/or violent/delinquent behavior. For these 10th grade groups, "moderate" indicates that, on average, group members either used alcohol or drugs in the past month *or* engaged in one to two violent/delinquent acts in the past year. Again, even these modest levels of risky behaviors predicted test scores approximately one full achievement level below those of groups that avoided these risky behaviors (see Figure 4).

Technical Discussion

The major finding of this study is that, in middle and high school, non-classroom aspects of the social environment are tightly linked to academic achievement. Even moderate levels of substance use and violence/delinquency among group members are linked to poorer performance. To improve achievement, schools and communities must join together to address substance use and violence/delinquency. Addressing academic skills in isolation will not result in the gains that schools are mandated to achieve.

Middle School

The final model for the middle school level revealed a direct effect of violence/delinquency involvement on achievement. While substance use involvement did not show a significant direct effect on achievement, the disturbance (error) terms of substance use involvement and violence/delinquency involvement were significantly correlated, indicating a shared cause between these two variables that our model did not identify. Substance use involvement affected achievement through this common association with violence/delinquency involvement.

As in other studies, poverty in the school also significantly predicted group achievement. Additionally, poverty was associated with groups' perceptions of their communities: the more students in a school living in poverty, the more likely a group was to dislike its community and to report not feeling safe there.

Perceived community risk was also associated with higher levels of involvement with violence/delinquency and substance use, and was closely tied to the overall level of social and moral understanding within the group. This association may identify an arena where intervention can be effective. In our analysis, good social and moral understanding was associated with lower levels of involvement with both substance use and violence/delinquency. Offering social-skills training at schools in high-risk communities may give students in those communities a protective boost, lowering their levels of substance use involvement and violence/delinquency involvement and, in turn, increasing test scores.

Improving groups' commitment to school may also be an effective way to intervene. Our analysis revealed a link between little school commitment and both lower social skills and greater perceptions of risk in the community. This relationship between commitment to school and community risk suggests that groups of students with overall negative perceptions of school

may generalize this negative perception to their community. While our model was specified to have little commitment to school predict perceptions of community risk, the alternative models that we ran do not rule out the possibility that community risk may be a predictor of school commitment. Little commitment to school also predicted substance use involvement, but not violence/delinquency involvement. Groups that were more committed to school were less involved with substance use. At the same time, groups with strong school commitment were also less involved with violence/delinquency because they had better social and moral understanding and perceived their communities as less risky.

High School

The final models at the high school level showed a direct effect of substance use behavior on math scores and a direct effect of violent/delinquent behavior on reading scores. However, violent/delinquent behavior had no direct effect on math scores, and substance use behavior had no direct effect on reading scores. A significant correlation between the disturbance terms for substance use behavior and violent/delinquent behavior indicated a common cause between these two factors that we did not model. Therefore, substance use behavior affected reading scores through its association with violent/delinquent behavior, and violent/delinquent behavior affected math scores through its association with substance use behavior.

Poverty within a high school directly predicted group math and reading scores. High levels of poverty within a school were also associated with increased perceptions of risk in the community. Additionally, perceived community risk directly predicted both math and reading scores (beyond the direct effect of poverty). This finding suggests that, in addition to poverty, other risk factors in the community impact average test performance in groups of high school students. These results suggest that test scores could be improved both by developing programs for those living in poverty and by reducing or eliminating other community risks.

Perceived community risk also directly predicted violent/delinquent behavior, but not violent/delinquent orientation. This suggests that efforts to change a group's perception of its community may also change violent/delinquent behavior, even if group orientation towards violence and delinquency are unaffected. Perception of community risk also predicted social and moral understanding, which, in turn, predicted substance use risk and violent/delinquent orientation. Additionally, social skills directly predicted substance use behavior. This suggests

that, as in middle school, social-skills training at schools in high-risk communities could significantly reduce risk factors and behaviors related to substance use and violence/delinquency in high school.

As in middle school, little commitment to school appeared to be an important variable in relation to substance use behavior, substance use risk, and violent/delinquent orientation. While school commitment did not directly predict test scores, a common relation was discovered through a variable or factor not identified in this model. Although it is difficult to interpret this correlation from our modeling, the result indicates a complex interaction between test scores and little commitment to school (see Table 4). Inspection of the bivariate correlations raises the possibility that the relationship between high school academic achievement and commitment to school could be an artifact of the grouping procedure. Although we expected a negative relationship between little commitment to school and the achievement factors (math and reading), the correlations were positive. A grouping effect may account for this surprising finding. The high school groups were larger than the middle school groups. Larger group size is probably associated with greater within-group heterogeneity for school commitment, and the heterogeneity could contribute to this anomalous result. It is also possible that school commitment is not an important predictor of academic achievement in high school groups. While other researchers have found a relation between individual commitment to school and individual achievement (Battistich, Solomon, Kim, Watson, & Schaps, 1995; Gottfredson, 1986; Suzanne Gayle Mouton, 1996; Suzanne G. Mouton, 1996; Pryor, 1994), group commitment to school may not significantly impact group achievement. Finally, this variable is a measure of commitment to *school*, not commitment to *learning*. It is possible that groups of high school students can be committed to the process of learning without feeling committed to the institution in which that learning takes place. In middle school, the distinction between school and learning may not be so fine grained.

Future Research

Further research should address questions generated by this analysis. First, the analysis should be subjected to replication at the group level. Second, we don't know the extent to which attitudes and perceptions within a group change over time. If attitudes change because of

intervention or through normal developmental processes, we should learn how these changes affect academic achievement.

We also need to define the common causal factor linking substance use and violent/delinquent behaviors. Once this factor is defined, we should identify the risk and protective factors that directly affect it and determine how they differ from factors (such as social/moral understanding) that directly affect violence/delinquency and substance use. Recent studies have reported a causal relationship between tobacco use and later delinquency (Newcomb et al., 2001). Because the co-morbidity between substance use and tobacco use is well documented, future research should specifically address the relationship between group tobacco use and the factors of violence/delinquency and substance use.

Conclusions and Policy Implications

Groups of middle and high school students with even moderate involvement with substance use and violence/delinquency had dramatically lower academic achievement than groups with little or no involvement in these behaviors. School poverty, a high level of perceived community risk, and low levels of school commitment and social/moral understanding increased the probability that groups of students would engage in these risky behaviors. When we controlled for the effects of poverty, *groups that were more involved with substance use or violence/delinquency still had significantly lower test scores.* These results were not linked to specific grade levels or achievement tests.

If schools and communities are concerned about improving achievement, they must learn more about the ways in which non-classroom factors impact the broader learning environment. Focusing solely on classroom activities and academic instruction will not result in the achievement gains for which schools must be accountable.

General Policy Implications

To improve academic achievement, we must address both attitudes and behaviors related to substance use and violence/delinquency. In groups of middle school students, we found that attitudes and behaviors concerning substance use and violence/delinquency were tightly linked. The correlation between attitudes and behaviors was somewhat lower in groups of high school students, but groups with positive attitudes towards risky behaviors also tended to engage in these behaviors. Clearly, if we are to reduce substance use and violence/delinquency, we must tackle attitudes and behaviors in concert.

Interventions need to be broadly based, looking outside the classroom and engaging the community. The results of our study strongly suggest that reducing community risk and promoting social/moral understanding and school commitment can reduce substance use and violence/delinquency *and* improve academic achievement. Pollard and colleagues (Pollard et al., 1999) concur, recommending that "... prevention policies and programs should focus on the reduction of risk and the promotion of protective influences if reduction in the substance use, crime, and violence among adolescents or the improvement in academic performance are

intended outcomes." This conclusion, has been echoed in studies of a broad spectrum of adolescent problem behaviors (Jessor & Jessor, 1978; Osgood, Johnston, O'Malley, & Backman, 1988). Efforts to improve school performance should address the learning environment *outside* the classroom—including individual, family, and community components of that environment.

Prevention efforts should focus on groups of students as well as on individuals with harmful attitudes and behaviors. The factors and variables that most powerfully affected substance use and violence/delinquency—community risk, commitment to school, and social/moral understanding—are essentially collective, not individual. The fact that they had such potent effects on groups of middle and high school students should not surprise us, since peer influence is never more powerful than during adolescence (Johnson, 2000). The importance of focusing on groups is underscored by the Surgeon General's 2001 Report on Youth Violence: "In schools, interventions that target change in the social context appear to be more effective, on average, than those that attempt to change individual attitudes, skills, and risk behaviors" (U.S. Department of Health and Human Services, 2001).

Different intervention strategies may be required for different groups of students. Additional group data can help us to understand the specific needs of different gender-by-race/ethnicity groups of adolescents. We found striking group effects, but there is no reason to assume that a single intervention strategy will work equally well for all groups (Gandara, 2000). To meet the needs of diverse populations, we should look to programs that use multiple strategies and engage the entire community (Manger, Hawkins, Haggerty, & Catalino, 1992). In designing targeted interventions, we must remember that the community is potentially both a source of risk and a source of protection, and we cannot assume that risk and protective factors operate the same way across all groups.

Intervention needs to start when students are young and continue through high school. Because the percentage of students engaged in risky behavior increases from middle to high school, prevention programs should start no later than 6th grade and continue through high school. A recent Department of Justice report found that teen gang membership in Seattle was predicted by the same risk factors—*at ages 10 to 12*—that were linked to risky behaviors and low achievement in this study (Hill, Lui, & Hawkins, 2001). Various risk and protective factors play out differently for middle school versus high school students. To design programs

appropriate to students of different grade levels, we must understand these developmental differences.

Across the state, 20 to 40 percent of students have reported involvement with substance use and/or violence/delinquency, indicating both the urgency of the problem and the need for action on a large scale (RMC Research Corporation, 2001). Nationwide, projects such as After-School Programs (Chung, 2000) and, in Washington, the Office of the Superintendent of Public Instruction's Foundations for Learning: Safe and Civil Schools Project (Washington State Institute for Public Policy, 2001) and the Governor's Substance Abuse Prevention Plan (Governor's Substance Abuse Prevention Advisory Committee, 1999), reflect a broad-based commitment to addressing this constellation of risky behaviors.

How Efficacy Research Can Direct Policy

Based on the best evidence to date, what intervention strategies are likely to succeed?

In a recent review of risk-prevention programs, the Surgeon General's Report on Youth Violence (U.S. Department of Health and Human Services, 2001) used strict criteria to evaluate the long-term effectiveness of intervention programs, sorting them into three categories: Model (highest effectiveness), Promising (meets minimal effectiveness standards), or Does Not Work (no effects or harmful effects).

In order to attain the highest (Model) ranking, programs had to (1) be evaluated by rigorously designed and *replicated* scientific studies, and (2) show that the programs in question significantly deterred violence/delinquency and/or risk factors for violence/delinquency for *at least a year* after intervention.

Below, we present brief descriptions of Model intervention and prevention approaches that might logically follow from the policy implications of our research findings. Each of these approaches has been found to significantly impact substance use and/or violence/delinquency. In some instances, investigators also reported positive effects on academic achievement.

School-based social-skills training has shown impressive results in both prevention and intervention programs. The Surgeon General reports that focusing on the development of social skills reduces both substance use and violence/delinquency (U.S. Department of Health and Human Services, 2001). In addition, many of the prevention and intervention programs identified

as effective by the National Institute of Drug Abuse (NIDA) include a social skills component (Hawkins, 2001).

Focusing interventions on groups rather than individuals also works. Research by Gottfredson and colleagues (Gottfredson, 1997) found that "school-based programs designed to change the social climate of the classroom or school are more effective than individual change programs" (U.S. Department of Health and Human Services, 2001).

Building school capacity to accommodate positive change has effectively reduced delinquency and substance use, and these positive effects were sustained for at least two years (U.S. Department of Health and Human Services, 2001). This type of intervention typically involves modifying decision-making processes and authority structures within schools (Gottfredson, 1997). Often teams of staff and (sometimes) community members, students, and parents work together to improve the school.

Behavioral techniques for classroom management successfully promote appropriate classroom behavior by establishing clear rules, praising student accomplishments, modeling desirable behaviors, and using other well-established behavioral techniques. Students who participated in programs that use these techniques have higher levels of attachment and commitment to school, lower levels of substance use and violence, and better academic performance than controls (U.S. Department of Health and Human Services, 2001).

Finally, although community-based youth development programs did not qualify as Model or Promising, they were *not* deemed ineffective. Because evaluation of programs that focus on general environmental change is difficult and costly, fewer rigorous evaluations of such programs have been done. Nevertheless, the Surgeon General's Report concludes that the strategy of community-based programs "is effective at reducing youth violence and violence-related outcomes" (U.S. Department of Health and Human Services, 2001). **Community outreach** is a vital, if inadequately documented, component to successful prevention (Center for Mental Health in Schools - UCLA, 2000).

These findings supports the notion that a public health approach, with a community-based emphasis on identifying risk and protective factors and intervening with effective programs, can help us achieve crucial academic and social gains for our children.

Information about the evaluations of specific prevention and intervention programs can be found at http://www.surgeongeneral.gov/library/youthviolence/youvioreport.htm and http://www.ncjrs.org/works/wholedoc.htm.]

Table 1. Demographics of Middle School and High School Groups

		Middle School		High School	
		Number	Percentage	Number	Percentage
Gender	Racial/Ethnic Groups				
Males					
	African-American	3	2.6	3	1.7
	Asian/Pacific Islander	5	4.3	10	5.7
	Hispanic	4	3.4	0	0
	Native American	0	0	0	0
	White	42	35.9	67	38.5
	Other	0	0	3	1.7
Females					
	African-American	5	4.3	6	3.4
	Asian/Pacific Islander	6	5.1	10	5.7
	Hispanic	3	2.6	4	2.3
	Native American	1	0.9	0	0
	White	48	41.0	70	40.2
	Other	0	0	1	0.6

Table 2. Descriptive Statistics for Sample in Comparison to Available Groups in the State

	Middle School					High School				
	Sample N = 117		State			Sample N = 174		State		
	X	SD	N	X	SD	X	SD	N	X	SD
Survey of Adolescent Health Behaviors										
Alcohol Use	1.54	0.19	284	1.56	0.23	2.29	0.21	187	2.30	0.22
Drug Use	1.22	0.14	290	1.23	0.16	1.85	0.29	186	1.86	0.30
Violent Behavior	1.20	0.15	283	1.21	0.17	1.27	0.18	184	1.28	0.18
Delinquent Behavior	1.13	0.11	283	1.08	0.12	1.27	0.16	184	1.27	0.15
Weapon Carrying	1.17	0.17	284	1.16	0.19	1.24	0.20	183	1.25	0.20
Antisocial Behavior	0.09	0.10	283	0.08	0.10	0.24	0.20	184	0.25	0.16
Drug Laws	0.87	0.15	249	0.85	0.17	1.49	0.18	184	1.50	0.19
Availability of Drugs	0.62	0.17	252	0.61	0.19	1.70	0.21	187	1.70	0.22
Perceived Risk from Drugs	0.28	0.14	262	0.27	0.16	1.00	0.25	180	1.01	0.25
Rebelliousness	0.58	0.18	280	0.57	0.22	0.84	0.17	183	0.85	0.17
Antisocial Attitude	0.39	0.15	266	0.37	0.16	0.62	0.17	181	0.63	0.18
Impulsiveness	0.98	0.14	239	0.97	0.14	1.05	0.09	181	1.05	0.09
Social Skills	2.22	0.20	243	2.24	0.22	1.83	0.23	175	1.83	0.24
Moral Beliefs	2.31	0.20	246	2.34	0.21	1.88	0.20	174	1.88	0.20
Community Disorganization	0.48	0.19	272	0.47	0.19	0.52	0.16	187	0.53	0.17
Neighborhood Attachment	0.88	0.20	291	0.89	0.21	1.15	0.17	189	1.15	0.17
Little School Commitment	0.94	0.17	286	0.96	0.19	1.35	0.16	187	1.34	0.17
Achievement (z-scores)	WA Assessment of Student Learning					Iowa Test of Basic Skills				
Math	-0.05	0.41	3686	-0.24	0.70	-0.13	0.37	2760	-0.29	0.72
Reading	-0.05	0.41	3677	-0.21	0.70	-0.12	0.41	2751	-0.27	0.72
Writing	-0.00	0.42	3643	-0.20	0.76	NA	NA	NA	NA	NA

Table 3. Middle School Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Alcohol Use	1.00																		
2	Drug Use	0.67	1.00																	
3	Violent Behavior	0.53	0.50	1.00																
4	Delinquent Behavior	0.49	0.49	0.74	1.00															
5	Weapon Carrying	0.51	0.57	0.80	0.60	1.00														
6	Antisocial Behavior	0.48	0.48	0.78	0.81	0.70	1.00													
7	Drug Laws	0.52	0.53	0.57	0.56	0.50	0.54	1.00												
8	Availability of Drugs	0.61	0.60	0.50	0.53	0.46	0.55	0.65	1.00											
9	Perceived Drug Risk	0.68	0.68	0.50	0.50	0.47	0.46	0.56	0.67	1.00										
10	Rebelliousness	0.53	0.41	0.61	0.58	0.49	0.50	0.45	0.44	0.65	1.00									
11	Antisocial Attitude	0.56	0.50	0.61	0.55	0.45	0.48	0.53	0.58	0.80	0.66	1.00								
12	Impulsiveness	0.53	0.46	0.54	0.55	0.47	0.48	0.48	0.50	0.65	0.73	0.69	1.00							
13	Social Skills	-0.53	-0.44	-0.70	-0.60	-0.59	-0.50	-0.47	-0.41	-0.56	-0.61	-0.71	-0.66	1.00						
14	Moral Beliefs	-0.61	-0.48	-0.68	-0.61	-0.55	-0.53	-0.48	-0.52	-0.67	-0.68	-0.81	-0.66	0.78	1.00					
15	Community Disorganization	0.39	0.44	0.32	0.42	0.33	0.31	0.45	0.42	0.47	0.48	0.48	0.48	-0.43	-0.48	1.00				
16	Neighborhood Attachment	0.39	0.35	0.29	0.36	0.25	0.23	0.42	0.32	0.42	0.50	0.47	0.46	-0.42	-0.44	0.73	1.00			
17	Little School Commitment	0.46	0.39	0.57	0.56	0.47	0.52	0.52	0.55	0.51	0.46	0.58	0.48	-0.55	-0.63	0.19	0.27	1.00		
18	Math	-0.27	-0.33	-0.27	-0.36	-0.20	-0.23	-0.31	-0.23	-0.25	-0.28	-0.25	-0.25	0.27	0.29	-0.64	-0.48	-0.01	1.00	
19	Reading	-0.38	-0.39	-0.44	-0.50	-0.33	-0.34	-0.51	-0.32	-0.36	-0.43	-0.37	-0.41	0.45	0.46	-0.67	-0.58	-0.14	0.88	1.00
20	Writing	-0.34	-0.33	-0.57	-0.50	-0.41	-0.38	-0.53	-0.35	-0.29	-0.34	-0.34	-0.32	0.52	0.47	-0.43	-0.31	-0.31	0.64	0.79

Table 4. High School Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Alcohol Use	1.00																	
2	Drug Use	0.74	1.00																
3	Violent Behavior	0.22	0.37	1.00															
4	Delinquent Behavior	0.44	0.65	0.73	1.00														
5	Antisocial Behavior	0.42	0.62	0.80	0.89	1.00													
6	Drug Laws	0.53	0.59	0.41	0.54	0.50	1.00												
7	Availability of Drugs	0.55	0.66	0.36	0.54	0.53	0.68	1.00											
8	Perceived Drug Risk	0.74	0.82	0.38	0.60	0.57	0.58	0.57	1.00										
9	Rebelliousness	0.28	0.34	0.48	0.53	0.55	0.31	0.36	0.44	1.00									
10	Antisocial Attitude	0.37	0.50	0.75	0.70	0.73	0.49	0.41	0.62	0.63	1.00								
11	Impulsiveness	0.16	0.14	0.31	0.30	0.36	0.28	0.16	0.23	0.50	0.45	1.00							
12	Social Skills	-0.54	-0.65	-0.70	-0.72	-0.74	-0.57	-0.51	-0.67	-0.53	-0.79	-0.46	1.00						
13	Moral Beliefs	-0.33	-0.41	-0.69	-0.61	-0.65	-0.41	-0.31	-0.55	-0.64	-0.82	-0.48	0.82	1.00					
14	Community Disorganization	0.09	0.20	0.33	0.27	0.32	0.36	0.28	0.09	0.25	0.23	0.33	-0.30	-0.25	1.00				
15	Neighborhood Attachment	-0.11	-0.04	-0.14	-0.16	-0.14	-0.10	-0.07	-0.07	-0.23	-0.20	-0.19	-0.11	-0.19	0.45	1.00			
16	Little School Commitment	0.43	0.39	0.30	0.39	0.39	0.43	0.40	0.58	0.49	0.48	0.29	-0.43	-0.43	0.01	0.04	1.00		
17	Math	0.16	0.21	0.13	0.14	0.13	0.16	0.10	0.04	-0.05	-0.03	-0.07	0.10	-0.02	-0.37	-0.32	0.25	1.00	
18	Reading	0.13	0.19	0.47	0.39	0.37	0.21	0.08	0.03	-0.22	-0.29	-0.21	0.33	0.27	-0.48	-0.31	0.21	0.80	1.00

Table 5. Factors and Independent Variables Included in the Middle School Model

Factors	Independent Variables
Achievement	Poverty
Substance Use Involvement	Little Commitment to School
Violence/Delinquency Involvement	
Perceived Community Risk	
Social and Moral Understanding	

Table 6. Standardized Middle School Factor Loadings from Best-Fit Structural Model

Factor name	Indicators for Factor	Factor Loading
Achievement		
	Math	0.87
	Reading	0.98
	Writing	0.74
Substance Use Involvement		
	Drug Use	0.77
	Alcohol Use	0.81
	Perception of Drug Laws	0.70
	Perception of Drug Risk	0.84
	Perception of Drug Availability	0.80
Violent/Delinquent Involvement		
	Violent Behavior	0.77
	Delinquent Behavior	0.75
	Antisocial Behavior	0.65
	Weapon Carrying	0.67
	Rebelliousness	0.76
	Impulsiveness	0.79
	Antisocial Attitudes	0.84
Perceived Community Risk		
	Community Disorganization	0.93
	Neighborhood Attachment	0.79
Social and Moral Understanding		
	Belief in the Moral Order	0.92
	Social Skills	0.84

Table 7. Factors and Independent Variables Included in the High School Model

Factors	Independent Variables
Substance Use Behavior	Little Commitment to School
Violent/Delinquent Behavior	Poverty
Substance Use Risk	Social Skills*
Violent/Delinquent Orientation	
Perceived Community Risk	
Social and Moral Understanding	

Dependent Variables
Math
Reading

* In addition to being an indicator of the Social and Moral Understanding factor, social skills was also used as an independent variable.

Table 8. Standardized High School Factor Loadings from Best-Fit Structural Model

Factor	Indicator	Factor Loading	
		Math	Reading
Substance Use Behavior			
	Drug Use	0.92	0.91
	Alcohol Use	0.79	0.78
Violent/Delinquent Behavior			
	Violent Behavior	0.86	0.87
	Delinquent Behavior	0.87	0.86
	Antisocial Behavior	0.92	0.90
Substance Use Risk			
	Perception of Drug Laws	0.60	0.60
	Perception of Risk from Drugs	0.89	0.89
	Drug Availability	0.66	0.66
Violent/Delinquent Orientation			
	Rebelliousness	0.67	0.68
	Impulsiveness	0.47	0.48
	Antisocial Attitudes	0.92	0.93
Perceived Community Risk			
	Community Disorganization	0.93	0.92
	Neighborhood Attachment	0.44	0.45
Social and Moral Understanding			
	Belief in the Moral Order	0.88	0.88
	Social Skills	0.94	0.95

Table 9. Standardized Path Coefficients for High School Model

From	To	Math	Reading
Substance Use Behavior	Math/Reading	-0.22	0.09 ns
Violent/Delinquent Behavior	Math/Reading	-0.08 ns	-0.62
Poverty	Math/Reading	-0.25	-0.19
Poverty	Perceived Community Risk	0.53	0.53
Perceived Community Risk	Math/Reading	-0.20	-0.22
Perceived Community Risk	Violent/Delinquent Behavior	0.11	0.11
Perceived Community Risk	Social and Moral Understanding	-0.28	-0.28
Violent/Delinquent Orientation	Violent/Delinquent Behavior	0.87	0.88
Little Commitment to School	Social and Moral Understanding	-0.45	-0.45
Little Commitment to School	Violent/Delinquent Orientation	0.13	0.13
Little Commitment to School	Substance Use Behavior	0.20	0.20
Little Commitment to School	Substance Use Risk	0.35	0.35
Social and Moral Understanding	Substance Use Risk	-0.65	-0.65
Social and Moral Understanding	Violent/Delinquent Orientation	-0.86	-0.86
Social Skills	Substance Use Behavior	-0.61	-0.62
Substance Use Behavior	Disturbance 1	0.68	0.68
Violent/Delinquent Behavior	Disturbance 2	0.41	0.41
Substance Use Risk	Disturbance 3	0.50	0.50
Math/Reading	Error 1	0.91	0.80

Correlations			
Disturbance 3 & 1	Set to	1.00	1.00
Disturbance 1 & 2		0.29	0.33
Error 1 and Little Commitment to School		0.39	0.53

Table 10. Unstandardized Equations for Achievement Level Estimates

Middle School

Achievement

(-0.1 * Substance Use Involvement) + (-1.05 * Violent/Delinquent Involvement) + (-0.91 * Poverty) + Error

High School

Math

(-0.49 * Substance Use Behavior) + (-0.18 * Violent/Delinquent Behavior) + (-1.00 * Community Risk) + (-0.56 * Poverty) + Error

Reading

(0.22 * Substance Use Behavior) + (-1.62 * Violent/Delinquent Behavior) + (-1.17 * Community Risk) + (-0.48 * Poverty) + Error

Figure 1, Middle School Structural Model with Standardized Path Coefficients

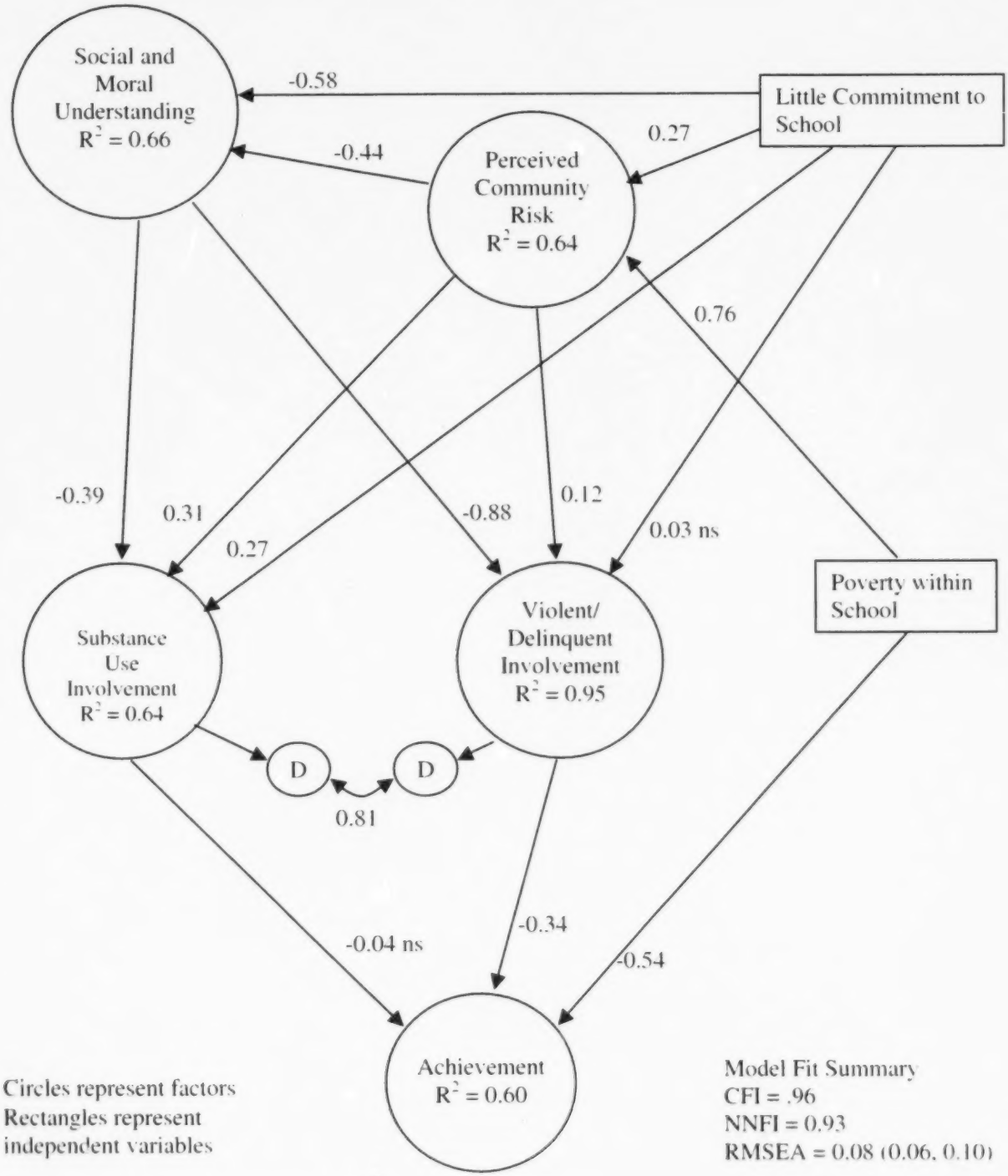
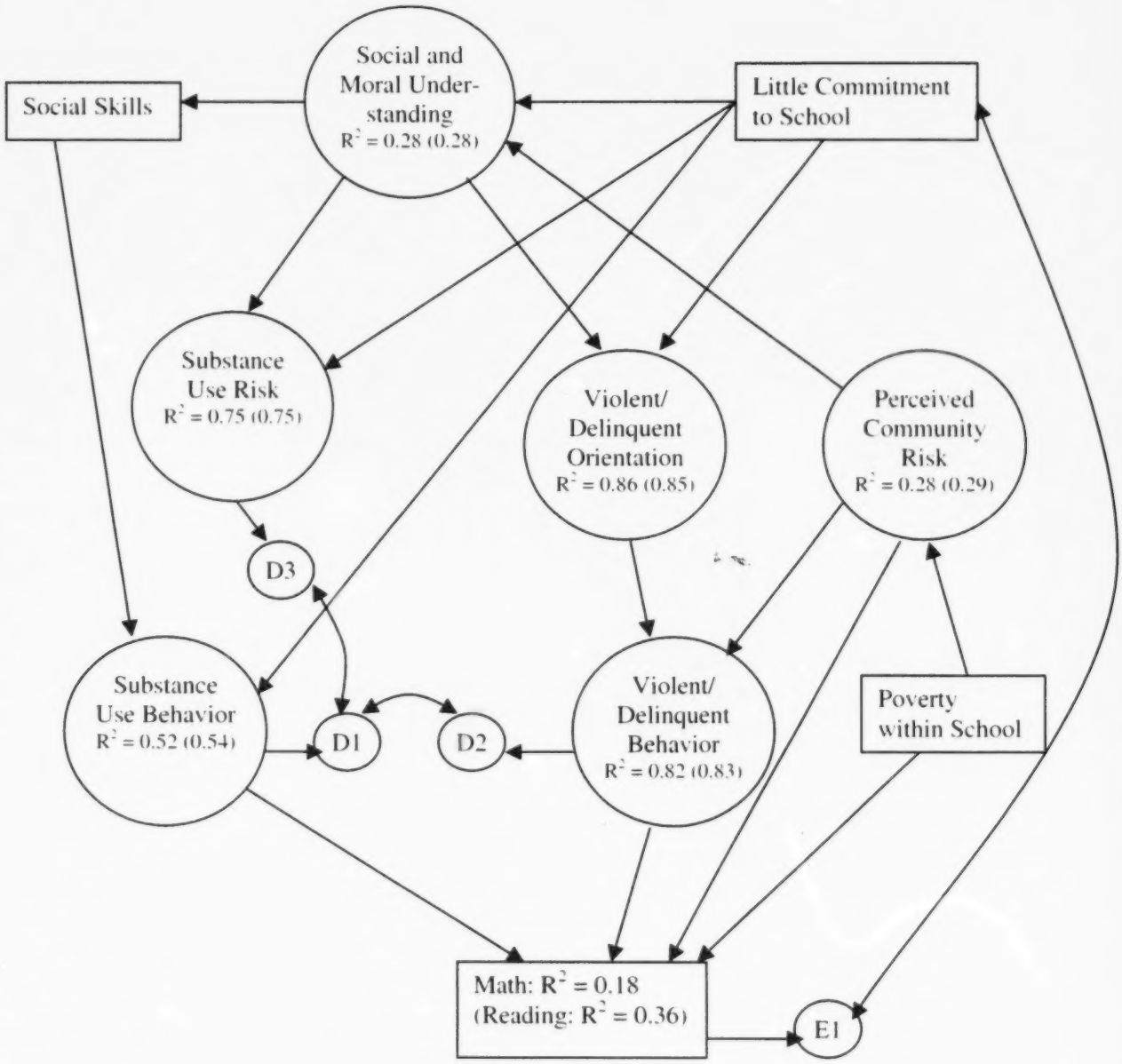


Figure 2. High School Structural Model



- Circles represent factors
- Rectangles represent independent variables
- Numbers in ( ) are for Reading

Model Fit Summary

	Math	Reading
CFI	0.93	0.94
NNFI	0.90	0.91
RMSEA	0.09	0.09

See Table 9 for path coefficients

Figure 3. Predicted Test Scores at the Middle School Level

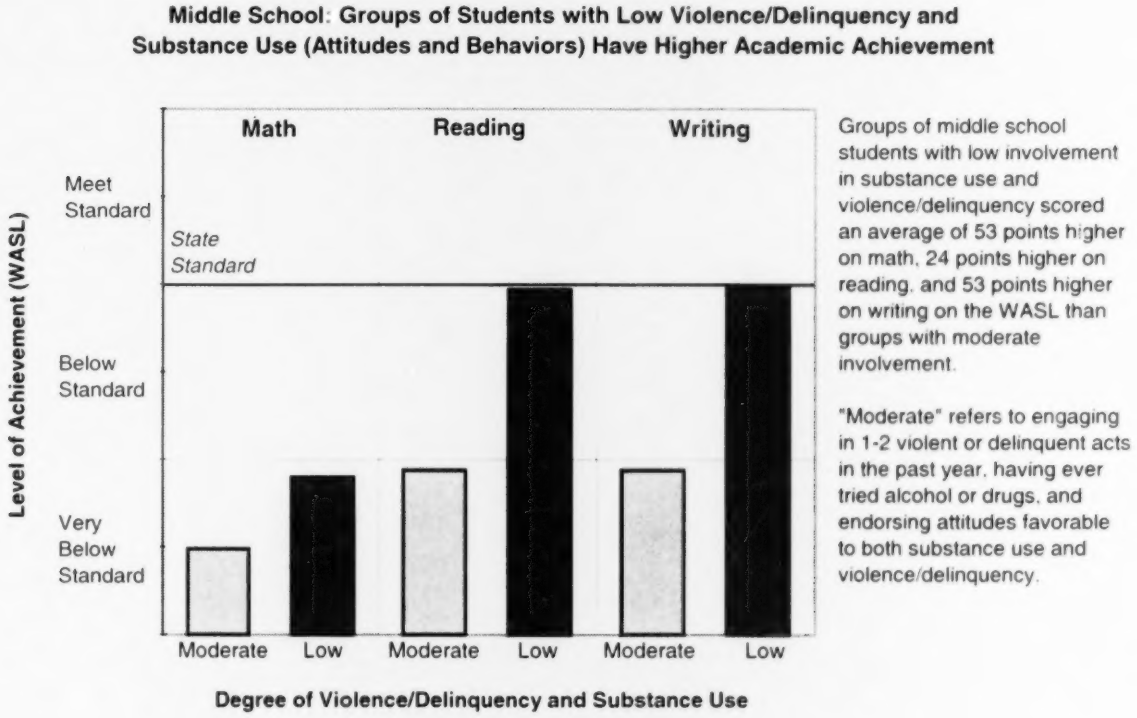
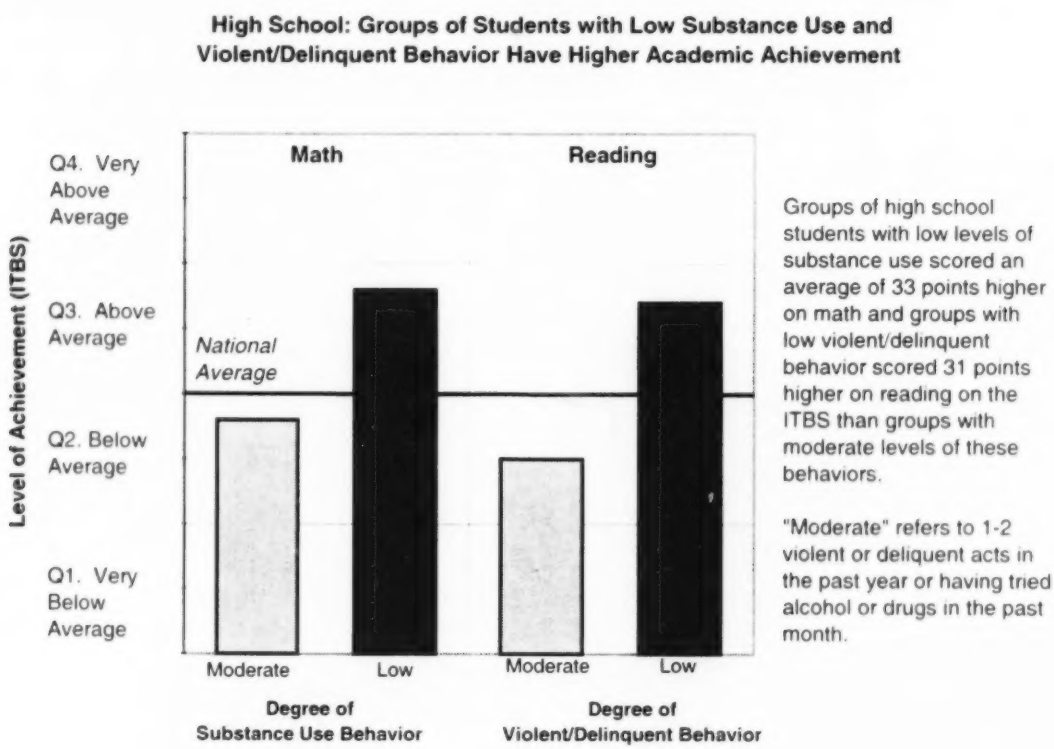

Middle School: Groups of Students with Low Violence/Delinquency and Substance Use (Attitudes and Behaviors) Have Higher Academic Achievement
Math
Reading
Writing
Meet Standard
State Standard
Below Standard
Very Below Standard
Level of Achievement (WASL)
Moderate
Low
Moderate
Low
Moderate
Low
Degree of Violence/Delinquency and Substance Use
Groups of middle school students with low involvement in substance use and violence/delinquency scored an average of 53 points higher on math, 24 points higher on reading, and 53 points higher on writing on the WASL than groups with moderate involvement.
"Moderate" refers to engaging in 1-2 violent or delinquent acts in the past year, having ever tried alcohol or drugs, and endorsing attitudes favorable to both substance use and violence/delinquency.

Figure 4. Predicted Test Scores at the High School Level


High School: Groups of Students with Low Substance Use and Violent/Delinquent Behavior Have Higher Academic Achievement
Level of Achievement (ITBS)
Q4. Very Above Average
Q3. Above Average
Q2. Below Average
Q1. Very Below Average
National Average
Math
Reading
Moderate
Low
Moderate
Low
Degree of Substance Use Behavior
Degree of Violent/Delinquent Behavior
Groups of high school students with low levels of substance use scored an average of 33 points higher on math and groups with low violent/delinquent behavior scored 31 points higher on reading on the ITBS than groups with moderate levels of these behaviors.
"Moderate" refers to 1-2 violent or deliquent acts in the past year or having tried alcohol or drugs in the past month.

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Appendix A: Questions from Washington State Survey of Adolescent Health Behaviors

Substance Use Behavior

Drug Use

Have you ever, even once in your lifetime, used any of the following drugs?	Yes	No
1. Marijuana or hashish (grass, hash, pot)		
2. Cocaine or crack (coke, rock, snow)		
3. Inhalants (snappers, poppers, rush, other things you sniff to get high)		
4. Hallucinogens (angel dust, LSD, acid, microdot, PCP, magic mushrooms)		
5. Heroin		
6. Amphetamines or any kind (speed, uppers, meth, bennies, crank) (do NOT include non-prescription or over-the-counter drugs, or drugs prescribed to you by a doctor)		
7. Methamphetamines (meth, crystal meth, ice, crank)		
8. Steroids (muscle builders)		

During the past 30 days, how many times have you used each of the following drugs?	None	1-2 times	3-5 times	6-9 times	10 or more times
1. Marijuana or hashish (grass, hash, pot)					
2. Cocaine or crack (coke, rock, snow)					
3. Inhalants (snappers, poppers, rush, other things you sniff to get high)					
4. Hallucinogens (angel dust, LSD, acid, microdot, PCP, magic mushrooms)					
5. Heroin					
6. Amphetamines or any kind (speed, uppers, meth, bennies, crank) (do NOT include non-prescription or over-the-counter drugs, or drugs prescribed to you by a doctor)					
7. Methamphetamines (meth, crystal meth, ice, crank)					

Alcohol Use

Have you ever, even once in your lifetime, used alcohol (beer, wine, wine coolers, liquor)?	Yes	No

During the past 30 days, how many times have you used alcohol (beer, wine, wine coolers, liquor)?	None	1-2 times	3-5 times	6-9 times	10 or more times

Think back over the last two weeks. How many times have you had five or more drinks in a row? (A drink is a glass of wine, a bottle of beer, a shot glass of liquor, or a mixed drink.)	None	Once	Twice	3 to 5 times	6 or more times

A - 2

Violent & Delinquent Behavior

Violence

During the past 30 days, how many times have you carried a weapon, such as a gun, knife or club for self-protection or because you thought you might need it in a fight?	None	1 time	2 or 3 times	4 or 5 times	6 or more times

How many times in the past year (12 months) have you:	Never	1 or 2 times	3 to 5 times	6 to 9 times	10 to 19 times	20 to 29 times	30 to 39 times	40+ times
1. Carried a handgun?								
2. Attacked someone with the idea of seriously hurting them?								

Delinquency

Have you ever belonged to a gang?	Yes	No

How many times in the past year (12 months) have you:	Never	1 or 2 times	3 to 5 times	6 to 9 times	10 to 19 times	20 to 29 times	30 to 39 times	40+ times
1. Been suspended from school?								
2. Sold illegal drugs?								
3. Been arrested?								

Weapon Carrying

When was the last time you carried each of the following weapons on school property for self protection or because you thought you might need it in a fight?	Never	Over one year ago	Not within the past month, but within the past year	Within the past month
1. Gun.				
2. Knife or razor.				
3. Club, stick, pipe or other weapon.				

Antisocial Behavior

How many times in the past year (12 months) have you:	Never	1 or 2 times	3 to 5 times	6 to 9 times	10 to 19 times	20 to 29 times	30 to 39 times	40+ times
1. Been suspended from school?								
2. Carried a handgun?								
3. Sold illegal drugs?								
4. Stolen or tried to steal a motor vehicle such as a car or motorcycle?								
5. Been arrested?								
6. Attacked someone with the idea of seriously hurting them?								
7. Been drunk or high at school?								
8. Taken a handgun to school?								

Substance Use Risk

Drug Laws

How wrong would most adults in your neighborhood think it was for kids your age:	Very wrong	Wrong	A little bit wrong	Not wrong at all
1. To use marijuana?				
2. To drink alcohol?				
3. To smoke cigarettes?				

About how many adults have you known personally who in the past year have:	None	1 adult	2 adults	3 or 4 adults	5 or more adults
1. Use marijuana, crack, cocaine, or other drugs?					
2. Sold or dealt drugs?					
3. Done other things that could get them in trouble with the police like stealing, selling stolen goods, mugging or assaulting others, etc.?					
4. Gotten drunk or high?					

	NO!	no	yes	Yes!
If a kid drank some beer, wine, or hard liquor (for example, vodka, whiskey, or gin) in your neighborhood would he or she be caught by the police?				
If a kid smoked marijuana in your neighborhood would he or she be caught by the police?				
If a kid carried a handgun in your neighborhood would he or she be caught by the police?				

Drugs Available

	Very hard	Sort of hard	Sort of easy	Very easy
If you wanted to get some beer, wine or hard liquor (for example, vodka, whiskey, or gin), how easy would it be for you to get some?				
If you wanted to get some cigarettes, how easy would it be for you to get some?				
If you wanted to get some marijuana, how easy would it be for you to get some?				
If you wanted to get a drug like cocaine, LSD, or amphetamines, how easy would it be for you to get some?				
If you wanted to get a handgun, how easy would it be for you to get one?				

Perceptions of Risk from Drugs

How much do you think people risk harming themselves if they:	No risk	Slight risk	Moderate risk	Great risk	Not Sure
Smoke one or more packs of cigarettes per day					
Try marijuana once or twice					
Smoke marijuana occasionally					
Take one or two drinks of an alcoholic beverage (beer, wine, liquor) nearly every day					

Violent & Delinquent Orientation

Rebelliousness

	Very false	Some-what false	Some-what true	Very true
I do the opposite of what people tell me, just to get them mad.				
I ignore rules that get in my way.				
I like to see how much I can get away with.				

Antisocial Attitude

How wrong do you think it is for someone your age to:	Very wrong	Wrong	A little bit wrong	Not wrong at all
1. Take a handgun to school?				
2. Steal anything worth less than $5?				
3. Steal anything worth more than $5?				
4. Pick a fight with someone?				
5. Attack someone with the idea of seriously hurting them?				
6. Stay away from school all day when their parents think they are at school?				

Impulsiveness

	NO!	no	yes	Yes!
It is important to think before you act.				
Do you have to have everything right away?				
I often do things without thinking about what will happen.				
Do you often switch from activity to activity rather than sticking to one thing at a time?				

Social and Moral Understanding

Social Skills

The next questions ask you what you would do in certain situations.

You're looking at CD's in a music store with a friend. You look up and see her slip a CD under her coat. She smiles and says "Which one do you want? Go ahead, take it while nobody's around." There is nobody in sight, no employees and no other customers. What would you do now?

- Ignore her
- Grab a CD and leave the store
- Tell her to put the CD back
- Act like it's a joke, and ask her to put the CD back

It's 8:00 on a weeknight and you are about to go over to a fiend's home when your mother asks you where you are going. You say "Oh, just going to hang out with some friends." She says, "No, you'll just get into trouble if you go out. Stay home tonight." What would you do now?

- Leave the house anyway
- Explain what you are going to do with you friends, tell her when you'd be home, and ask if you can go out
- Not say anything and start watching TV
- Get into an argument with her

You are visiting another part of town, and you don't know any of the people your age there. You are walking down the street, and some teenager you don't know is walking toward you. He is about your size, and as he is about to pass you, he deliberately bumps into you and you almost loose you balance. What would you say or do?

- Push the person back
- Say nothing and keep on walking
- Say "Watch where you're going" and keep on walking
- Swear at the person and walk away

You are at a party at someone's house, and one of your friends offers you a drink containing alcohol. What would you say or do?

- Drink it
- Tell your friend "No thanks. I don't drink" and suggest that you and your friend go and do something else
- Just say "No thanks" and walk away
- Make up a good excuse, tell your friend you had something else to do, and leave

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Belief in the Moral Order

	NO!	no	yes	Yes!
I think it is okay to take something without asking if you get away with it.				
I think sometimes it's okay to cheat at school.				
It is all right to beat up people if they start the fight.				
It is important to be honest with you parents, even if they become upset or you get punished.				

Perceived Community Risk

Community Disorganization

How much do each of the following statements describe your neighborhood:	NO!	no	yes	Yes!
1. Crime and/or drug selling.				
2. Fights.				
3. Lot of empty or abandoned buildings.				
4. Lots of graffiti.				

	NO!	no	yes	Yes!
I feel safe in my neighborhood.				

Neighborhood Attachment

	NO!	no	yes	Yes!
I like my neighborhood.				
If I had to move, I would miss the neighborhood I now live in.				
I'd like to get out of my neighborhood.				

Little Commitment to School

How often do you feel that the school work you are assigned is meaningful and important?	Almost always	Often	Sometimes	Seldom	Never
How interesting are most of your courses to you?	Very interesting and stimulating	Quite interesting	Fairly interesting	Slightly dull	Very dull
How important do you think the things you are learning in school are going to be for your later life?	Very important	Quite important	Fairly important	Slightly important	Not at all important

Now, thinking back over the past year in school, how often did you . . .	Never	Seldom	Sometimes	Often	Almost always
1. Enjoy being at school?					
2. Hate being in school?					
3. Try to do your best work in school?					

During the LAST FOUR WEEKS how many whole days have you missed school. . .	None	1	2	3	4-5	6-10	11 or more
1. Because of illness.							
2. Because you skipped or cut.							
3. For other reasons.							

The Impact of Substance Use and Violence/Delinquency on Academic Achievement For Groups of Middle and High School Students in Washington

Summary of a Report by Washington Kids Count
Human Services Policy Center, University of Washington, May 2002

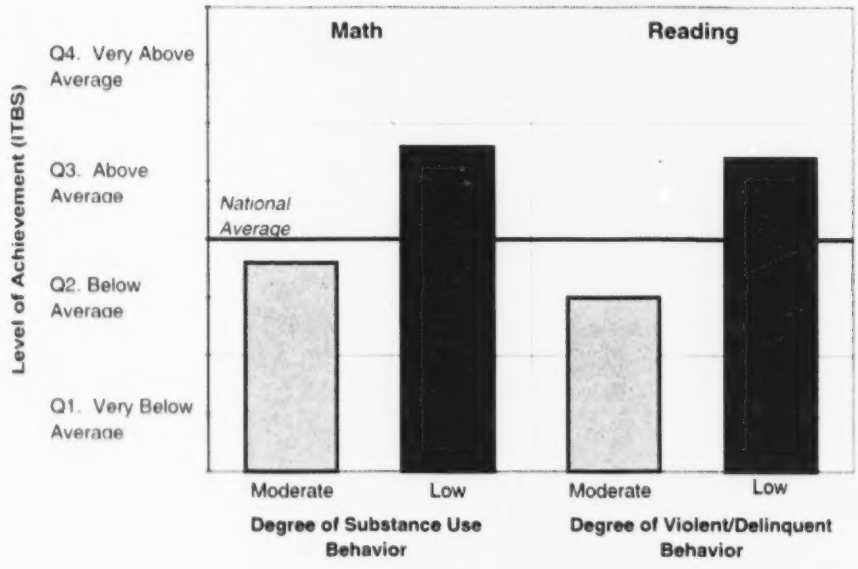
Little is known about how aspects of the social environment affect academic achievement among *groups of students*. In this study we examined the associations among substance use, violent/delinquent behavior, and academic achievement (as indicated by test scores) in groups of middle school and high school students. We also looked at the effects of poverty and several risk-and-protective factors. Within each school, we defined groups according to grade, gender, and racial/ethnic identity.

Major Findings

Groups of middle and high school students with even *moderate* involvement with substance use and violence/delinquency have dramatically lower academic achievement than groups of students with little or no involvement in these behaviors. Moderate substance use and/or violence/delinquency were associated with test scores a full level below scores of groups of students not involved in these behaviors. These findings take into account important factors such as gender, race-ethnicity, and poverty. [See Figures 1 and 2, below and on the following page.]

These findings are important because 20 to 40 percent of middle school and high school students report involvement with substance use and/or violence/delinquency. Large-scale prevention programs will be necessary if we expect most students to achieve our state's learning goals. To improve academic achievement we must address *both attitudes and behaviors* related to substance use and violence/delinquency. Our efforts should be broad-based, engaging the community and looking at risk-and-protective factors outside the classroom. Intervention needs to start when students are young and continue through high school.

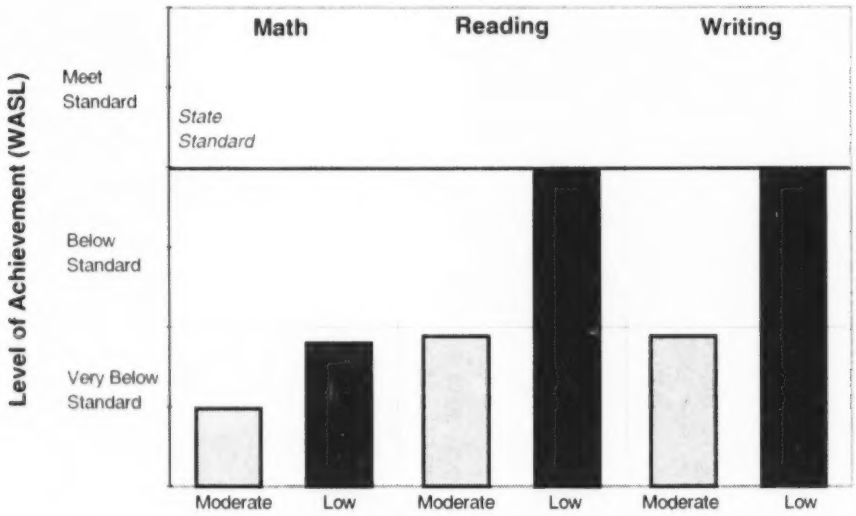
Figure 1. High School: Groups of Students with Low Substance Use and Violent/Delinquent Behavior Have Higher Academic Achievement



Groups of high school students with low levels of substance use scored an average of 33 points higher on math and groups with low violent/delinquent behavior scored 31 points higher on reading on the ITBS than groups with moderate levels of these behaviors.

"Moderate" refers to 1-2 violent or deliquent acts in the past year or having tried alcohol or drugs in the past month.

Figure 2. Middle School: Groups of Students with Low Violence/Delinquency and Substance Use (Attitudes and Behaviors) Have Higher Academic Achievement



Groups of middle school students with low involvement in substance use and violence/delinquency scored an average of 53 points higher on math, 24 points higher on reading, and 53 points higher on writing on the WASL than groups with moderate involvement.

"Moderate" refers to engaging in 1-2 violent or delinquent acts in the past year, having ever tried alcohol or drugs, and endorsing attitudes favorable to both substance use and violence/delinquency.

To be effective, comprehensive prevention strategies must start before middle school and carry through high school, and they need to focus on groups as well as individuals. Interventions to counter substance use and violence/delinquency frequently take place in a classroom setting, so information about group behavior should help us to design and target appropriate prevention modules.

Data Sources

Measures: To conduct this analysis, we combined, for middle school: (a) group data from the 6th grade on student behaviors, attitudes, and risk-and-protective factors from the 1998 Washington State Survey of Adolescent Health Behaviors (WSSAHB) with (b) group averages for 7th graders on the 1999 Washington Assessment of Student Learning (WASL). For high school, we combined: (a) 10th grade group data from the 1998 WSSAHB with (b) 11th grade group averages on the Iowa Test of Basic Skills (ITBS).

Groups: Within schools we defined groups by grade level, gender, and race/ethnicity. We obtained data for 117 groups from 71 middle schools that included both 6th and 7th grades, and 174 groups from 72 high schools. Our groups ranged in size from 15 to 202 students. We insisted upon a minimum of 15 students per group so that outlying scores would not artificially skew the group averages. The distributions of race/ethnic and poverty characteristics in our groups are generally representative of the student population in Washington State.

Poverty and School Resources: We also used data from the Office of the Superintendent of Public Instruction (OSPI) on the percentage of low-income students in each school, as measured by eligibility for the free or reduced-price lunch program, and on the financial and teacher resources available in each school.

What Affects Whether Groups of Students Get Involved With Substance Use and Violence/ Delinquency?

Attitudes and Behaviors Are Closely Related.

We found that for groups of *middle school students*, behavior and attitudes about harmful behaviors are tightly linked (correlation = 0.96). That is, the same groups that think it's OK to use alcohol or drugs, know where to obtain them, and think they are unlikely to get caught, are also using them. Similarly, groups of middle school students with antisocial and rebellious attitudes are also involved in violent/delinquent behaviors (correlation = 0.91). For our groups of middle school students, therefore, we combined the attitudinal and behavioral components of the WSSAHB into factors called "Substance Use Involvement" and "Violence/Delinquency Involvement."

In high school, behaviors and attitudes are closely related, but not identical, constructs, so we did not combine them in our analyses. Still, groups with favorable attitudes towards high-risk behaviors tend to engage in these behaviors.

Substance Use Is Closely Related to Violence/Delinquency.

For groups of middle school students, substance use involvement and violence/delinquency involvement are highly correlated ($r = 0.81$). That is, groups with high-risk attitudes and behaviors related to violence/delinquency also have high-risk attitudes and behaviors related to substance use. The strong association between these factors suggests that any attempt to reduce substance use in a group of students are also likely to reduce violence/delinquency for that group – and enhance academic achievement. (Similarly, attempts to reduce violence/delinquency are also likely to reduce substance use and boost school performance.)

Among groups of high school students, violent/delinquent behavior and substance use are somewhat correlated ($r = 0.29$). Groups of students who engage in substance use also tend to engage in violent/delinquent behavior, but the relationship does not always hold: several groups engage in one behavior and not the other. Still, the fact that these behaviors are linked suggests that prevention programs should address violence/delinquency and substance use in concert.

Poverty Is a Potent Factor That Influences Student Behavior, Attitudes, and Academic Achievement.

The percentage of low-income students in a school directly affects test scores. Poverty also increases levels of community risk, which is linked to harmful behaviors and lower achievement. We found evidence of these poverty effects for both middle and high school students. *However, even when the effects of poverty are accounted for, groups that are more involved with substance use or violence/delinquency have significantly lower test scores.*

School Resources Do Not Predict Substance Use, Violence/Delinquency, or Test Scores.

We compiled data on key resources for each school (such as programmatic spending per pupil, student-to-teacher ratio, and staff spending per pupil). These school resource variables did not predict substance use, violence/delinquency, or test scores. This finding is consistent with other analyses that have shown little relationship between school spending and achievement. We did not assess spending at the district level, but district spending has been shown to affect test scores (State of Washington's Children, 2001).

Risk-and-Protective Factors Influence Test Scores, Substance Use, and Violence/Delinquency.

In this study, we also asked:

(a) Whether risk-and-protective factors affected test scores directly (regardless of harmful behaviors); or
(b) Whether risk-and-protective factors affected test scores by increasing the likelihood that groups of students would engage in substance use and violence/delinquency.

In addressing this important question we examined three important aspects of risk and protection: *Social and Moral Understanding*, *Perceived Community Risk*, and *School Commitment*. [See Figure 4 on following page.]

Figure 4: Components of Risk-and-Protective Factors

Social and Moral Understanding	
Moral Beliefs	Think it is acceptable to do things such as: cheat at school; take things without asking; be dishonest with parents.
Social Skills	Ability to deal with difficult situations such as where friends are stealing; or urging substance use; or other teenagers are starting a conflict.
Community Risk	
Community disorganization	Presence of crime, drug selling, and abandoned buildings.
Neighborhood attachment	Like the neighborhood; would miss it if moved away.
School Commitment	Feelings about school such as: believe assignments/topics are not meaningful or important in later life; hate being in school; skip attending.

Middle School: For groups of middle school students, test scores were not directly linked to risk-and-protective factors. However, risk-and-protective factors did impact substance use and involvement with violence/delinquency, which in turn impacted test scores.

- Strong *social and moral understanding* was directly associated with lower involvement with both substance use and violence/delinquency.
- Groups of middle school students who *perceived their communities as riskier* were also more involved with both substance use and violence/delinquency. Higher community risk was also associated with lower social and moral understanding.
- Groups with low *commitment to school* were more involved with substance use. At this age, however, commitment to school did not relate directly to violence/delinquency.

High School: In high school, risk-and-protective factors significantly impacted both substance use and violence/delinquency. In addition, we found direct links between risk factors and test scores.

- As in middle school, *social and moral understanding* was directly linked to attitudes about both substance use and violence/delinquency. Furthermore, high levels of *social skills* were directly linked to lower levels of substance use.
- Groups of high school students who *perceived their communities as risky* had lower test scores (a direct effect). They also had higher levels of violent and delinquent behavior.
- As in middle school, *school commitment* influenced both attitudes and behavior. Low commitment to school was associated with more substance use and more positive attitudes towards both substance use and violence/delinquency. School commitment also appears to have a complex relationship with test scores that could not be fully explored in this study.

How Widespread Are Substance Use and Violence/Delinquency Among Washington Students?

Findings from the 2000 Washington State Survey of Adolescent Health Behaviors (RMC, 2001) provide context for our group analyses. If only a few Washington students are involved in these behaviors, then our policies should be narrowly targeted. The 2000 WSSAHB found, however, that 20 to 40 percent of Washington middle school and high school students reported the kinds of attitudes and behaviors that our analyses linked to impaired school performance.

We cannot stress enough that individual students with these attitudes and behaviors are not concentrated in a few groups, but are distributed throughout schools, communities, and social groups all over the state. Peer influence is never more powerful than during adolescence. Given the high prevalence of these harmful attitudes and behaviors among individual students, it is impossible to prevent their broad dissemination. It *is* possible, however, to counter the effects of these attitudes and behaviors with interventions that target the same milieu – the social environment – where students encounter and must make their own decisions about substance use and violence/delinquency.

What Are the Policy Implications of These Findings?

(1) To Improve Test Scores We Must Address Both Attitudes and Behaviors Related to Substance Use and Violence/Delinquency.

If we are to assure that every student receives a sound education, we must reduce students' involvement with alcohol/drugs and violence/delinquency. We found that, within groups of middle and high school students, even low to moderate involvement with these behaviors is associated with serious decrements in test scores. The relationship between test scores and harmful behaviors/attitudes is strong even when such important factors as gender, race-ethnicity, and poverty are taken into account.

(2) Our Efforts Need to Be Broad-based, Looking Outside the Classroom and Engaging the Community.

This report shows conclusively that factors *outside the realm of classroom instruction* significantly impact academic achievement. Our study also confirms, at the group level, that specific risk-and-protective factors affect the degree to which groups of students are involved with harmful behaviors. These factors include moral beliefs and social skills, as well as the stability or disorganization of the community. Efforts to improve school performance should therefore address the learning environment *outside* the classroom – including individual, family, and community components of that environment. These efforts should focus on *groups of students* as well as on individuals with harmful attitudes and behaviors. The importance of focusing on the social environment is underscored by the Surgeon General's assertion that, "in schools, interventions that target change in the social context appear to be more effective, on average, than those that attempt to change individual attitudes, skills, and risk behaviors" (U.S. Department of Health and Human Services, 2001).

(3) Intervention Needs to Start When Students Are Young and Continue Through High School.

Because the percentage of students engaged in harmful behavior increases from middle- to high school, prevention programs should start no later than 6th grade and continue through high school. There are significant differences in the ways that various risk-and-protective factors play out for middle school versus high school students. We must understand these differences in order to design programs appropriate to the needs of children at each grade level. Across the state, 20 to 40 percent of individual students have reported involvement with substance use and/or violence/delinquency, indicating both the urgency of the problem and the need for action on a large scale.

Notes on Measures and Analyses

The Washington State Survey of Adolescent Health Behaviors asks a wide range of questions about students' use of harmful substances and about their attitudes regarding substance use. We elaborate on these measures in Figure 3.

Figure 3: Measures of Involvement With Substance Use and Violence/Delinquency

Substance Use

- *Behavioral Component*
  - Alcohol Use (Never, In life but not in past 30 days, In last 30 days, 10+ times in 30 days)
  - Drug Use (Never, In life but not in past 30 days, In last 30 days, 10+ times in 30 days)
- *Attitudinal Component*
  - Attitude towards substances
  - Perception of local substance laws
  - Perception of substance availability

Violence/delinquency

- *Behavioral Component*
  - Violent Behaviors (None in last year, One-two in last year, Three+ or one behavior 10 times in last year)
  - Delinquent Behaviors (None in last year, One-two in last year, Three+ or one behavior 10 times in last year)
  - Carry Weapon in School (Never, In life but not past year, In last year, In last month)
  - Antisocial Behavior (Rating scale consisting of several antisocial behaviors)
- *Attitudinal Component*
  - Rebelliousness
  - Impulsiveness
  - Antisocial Attitudes
  - Time of First Antisocial Behavior (In high school only)

Because the attitudinal and behavioral components relating to substance use and violence/delinquency were so tightly linked in our groups of middle school students, we combined these attitudinal and behavioral components into factors called "Substance Use Involvement" and "Violence/Delinquency Involvement," and used these combined factors in our analyses of test scores. For high school students, behavior and attitudes are closely correlated, but to a lesser degree, so we treated them separately in our analyses.

The analyses reported here were conducted using Structural Equation Modeling (SEM). SEM is a statistical process that allows us to explore directional relationships between groups of variables. We estimated the test scores for groups of students at different levels of harmful behavior by using equations derived from the SEM. A complete discussion of the analyses is contained in the full report.

Obtaining Full Report

The full report of this analysis is available online (www.hspc.org) or by calling (206) 685-7613. Additional copies of this report may also be obtained from the Washington State Alcohol/Drug Clearinghouse at 1-800-662-9111 (within Washington State) or 206-725-9696 (within Seattle or outside of Washington State), by e-mail at clearinghouse@adhl.org, or by writing them at 3700 Rainier Avenue South, Suite A, Seattle, Washington 98144.

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